DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

Volume I
Main Document

February 2005

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

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Abbreviations and Acronyms

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Abbreviations and Acronyms

1995 Bay-Delta Plan	Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary
Bay-Delta	San Francisco Bay-Delta
CALFED	CALFED Bay-Delta Program
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CEQA	California Environmental Policy Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
COA	Coordinated Operating Agreement
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVPM	Central Valley Production Model
D-1485	State Board Decision 1485
D-1641	State Board Decision 1641
Delta	Sacramento-San Joaquin River Delta
DMC Unit	Delta-Mendota Canal Unit
DWR	California Department of Water Resources
EA	Environmental Assessment
EBMUD	East Bay Municipal Utilities District
EWA	Environmental Water Account
F	Fahrenheit
FMMP	Farmland Mapping and Monitoring Program
FRWA	Freeport Regional Water Authority
FRWP	Freeport Regional Water Project
GAP	Geographic Assistance to Planning
GBP	Grasslands Bypass Project
GDA	Grassland Drainage Area
HORB	Head of Old River Barrier
Interior	Department of the Interior
Intertie	Delta-Mendota Canal/California Aqueduct Intertie
JPOD	Joint point of diversion
M&I	Municipal and industrial
mgd	Million gallons per day
mg/L	Milligrams per liter
NEPA	National Environmental Policy Act

NO_x	Nitrogen oxides
NRHP	National Register of Historic Places
O_3	Ozone
O&M	Operations and maintenance
OCAP	Operations Criteria and Plan
Ops Group	CALFED Operation Coordination Group
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	Particulate matter
Reclamation	U.S. Bureau of Reclamation
Regional Board	Regional Water Quality Control Board
SCWA	Sacramento County Water Agency
Secretary	Secretary of the Interior
Service	U.S. Fish and Wildlife Service
SJVAB	San Joaquin Valley Air Board
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
State Board	State Water Resources Control Board
SWP	State Water Project
TFCF	Tracy Fish Collection Facility
TRFES	Trinity River Flow Evaluation Study
USEPA	U.S. Environmental Protection Agency
VAMP	Vernalis Adaptive Management Plan
WQCP	Water Quality Control Plan for the Delta and Suisun Marsh

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
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Executive Summary

February 2005

EXECUTIVE SUMMARY

This environmental assessment evaluates the consequences of implementing provisions associated with the renewal of long-term water service contracts to contractors in the Delta-Mendota Canal Unit of the Delta Division of the Central Valley Project. These provisions are embodied in four alternatives, including the No-Action Alternative, Alternative 1, and Alternative 2, and the Preferred Alternative. The No-Action Alternative is the same as the Preferred Alternative identified in the Central Valley Project Improvement Act Programmatic Environmental Impact Statement. Alternative 1 is based upon, but differs slightly from the counterproposal prepared by the contractors in April 2000. Alternative 2 is based upon, but differs slightly from the proposal initially submitted by the government in November 1999, to which the contractors responded with their counterproposal. The Preferred Alternative is the final negotiated contract that falls between Alternative 1 and Alternative 2.

This environmental assessment contains five chapters. Chapter 1 discusses the purpose and need for the action of renewing the long-term water service contracts. It discusses the basis for such renewals across the entire Central Valley Project and within the Delta-Mendota Canal Unit. It also discusses the relationship between contract renewals and the Central Valley Project Improvement Act Programmatic Environmental Impact Statement and reviews several related actions and programs that affect water supply reliability south of the Delta.

Chapter 2 describes the four alternatives and includes reviews of the long-term contract renewal process and relevant issues, including water needs analyses, water transfers, tiered water pricing, the definition of municipal and industrial users, and water measurement within the context of each alternative. The table at the end of Chapter 2 compares the provisions of the four alternatives.

Chapter 3 reviews the affected environment and environmental consequences that could result from implementation of either Alternative 1 or Alternative 2 when compared to the No-Action Alternative. The Preferred Alternative is not addressed in this chapter because its provisions lie between the range of alternatives analyzed in this EA with respect to potential impacts.

The No-Action Alternative is the Preferred Alternative identified in the Central Valley Project Improvement Act Programmatic Environmental Impact Statement. Chapter 3 begins with descriptions of the 20 contractors in the Delta-Mendota Canal Unit. The affected environment and environmental consequences of Alternatives 1 and 2 are then

evaluated for agriculture; socioeconomics; land use; air quality; soils and geology; groundwater; surface water resources; biological, cultural, recreational, and visual resources; and public health. Table ES-1 summarizes the environmental consequences that could result from implementation of Alternative 1, Alternative 2, or the Preferred Alternative when compared to the No-Action Alternative. Cumulative impacts on a Central Valley Project-wide basis are addressed in the Central Valley Project Improvement Act Programmatic Environmental Impact Statement. Beyond those cumulative impacts, there are no additional cumulative impacts attributable from Alternative 1, Alternative 2, or the Preferred Alternative that would contribute to cumulative impacts.

Chapter 4 reviews other considerations, including environmental justice and Indian trust assets.

Chapter 5 reviews consultation and coordination activities conducted as part of the long-term contract renewal process.

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

Chapter 1
Purpose and Need

February 2005

CHAPTER 1

PURPOSE AND NEED

INTRODUCTION

BACKGROUND

The Central Valley Project (CVP) is the largest water storage and delivery system in California, with a geographic scope covering 35 of the state's 58 counties. The CVP is divided into nine divisions. This Environmental Assessment (EA) deals with the Delta-Mendota Canal Unit, one unit of the Delta Division. The U.S. Bureau of Reclamation (Reclamation) and the Delta-Mendota Canal Unit (DMC Unit) Contractors propose to renew the long-term water service contracts to deliver water from the CVP for agricultural and municipal and industrial (M&I) uses. The renewal of these contracts would allow continued CVP water delivery to the contractors within the DMC Unit. This EA, prepared by Reclamation, evaluates the impacts of long-term water service contract renewals.

STATUTORY AUTHORITIES

Renewal of these contracts is being undertaken in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), as amended and supplemented, including, but not limited to the Acts of August 26, 1937 (50 Stat. 844) as amended and supplemented; August 4, 1939 (53 Stat. 1187) as amended and supplemented; July 2, 1956 (70 Stat. 483); June 3, 1960 (74 Stat. 156); June 21, 1963 (77 Stat. 68); October 12, 1982 (96 Stat. 1262); and October 27, 1986 (100 Stat. 3050); and Title XXXIV of the CVPIA of October 30, 1992 (106 Stat. 4706).

NUMBER AND BREADTH OF CONTRACTS

Reclamation proposes to renew 114 CVP water service contracts throughout the Central Valley. These contracts include an annual maximum quantity of approximately 5.6 million acre-feet of CVP water and provide water service to approximately 3.2 million irrigable acres of land and an urban population in excess of 4.3 million.

PURPOSE AND NEED FOR THE ACTION

On October 30, 1992, the President signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law [PL] 102-575), which included Title XXXIV, the Central Valley Project Improvement Act (CVPIA). The CVPIA amended the previous

authorizations of the CVP to achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife and agricultural, M&I, and power contractors. Through the CVPIA, Reclamation is developing policies and programs to improve the environmental conditions that were affected by the operation and maintenance and physical facilities of the CVP. The CVPIA also includes tools to facilitate larger efforts in California to improve environmental conditions in the Central Valley and the San Francisco Bay-Delta system (Bay-Delta). Section 3404(c) of the CVPIA directs the Secretary of the Interior (Secretary) to renew existing CVP water service and repayment contracts following completion of a Programmatic Environmental Impact Statement (PEIS) and other needed environmental documentation by stating that:

> … *the Secretary shall, upon request, renew any existing long-term repayment or water service contract for the delivery of water … for a period of 25 years and may renew such contracts for successive periods of up to 25 years each* ... [after] *appropriate environmental review, including preparation of the environmental impact statement required in section 3409* [i.e., the CVPIA PEIS] … *has been completed.*

Section 3404(c) of the CVPIA states that 25 years will be the upper limit for long-term irrigation repayment and water service contracts within the CVP. However, Section 3404(c) did not amend the provisions of Section 9(c) of the Reclamation Project Act of 1939 and the Reclamation Project Act of June 21, 1963, which authorized renewal of M&I water contract terms for up to 40 years. These authorizations remain in place as guidance for establishing the terms of M&I contracts. Therefore, under the federal action, the term for agricultural (irrigation) water service contracts will be 25 years, the term for mixed agricultural/M&I water service contracts will be 25 years, and the term for M&I-only long-term water service contracts will be 40 years.

Section 3409 of the CVPIA required the Secretary to prepare a PEIS to evaluate the direct and indirect adverse impacts and benefits of implementing the CVPIA. The PEIS was prepared under the National Environmental Policy Act (NEPA) by Reclamation and U.S. Fish and Wildlife Service (Service).

Reclamation released a Draft PEIS on November 7, 1997 (Reclamation 1997a). The Service became a co-lead agency in August 1999. An extended comment period closed on April 17, 1998. Reclamation and the Service released the Final PEIS in October 1999 (Reclamation and Service 1999) and the Record of Decision in January 2001.

The purpose of the federal action is to renew the DMC Unit long-term water service contracts, consistent with Reclamation authority and all applicable state and federal laws, including the CVPIA. The project alternatives include the terms and conditions of the long-term contracts and tiered water pricing. Long-term water service contract renewal is needed to:

- Continue the beneficial use of water, developed and managed as part of the CVP, with a reasonable balance among competing demands, including the needs of irrigation and domestic uses; fish and wildlife protection, restoration, and mitigation; fish and wildlife enhancement; power generation; recreation; and other water uses consistent with requirements imposed by the State Water Resources Control Board (State Board) and the CVPIA.

- Incorporate certain administrative conditions into the renewed contracts to ensure continued CVP compliance with current federal Reclamation law and other applicable statutes.

- Allow the continued reimbursement to the federal government for costs related to CVP construction and operation.

BASIS OF CVP WATER SERVICE CONTRACT RENEWALS

Reclamation is responsible for operational control of the CVP, including securing payment for the cost of water and for operation and maintenance established in the water service contract with the federal government. In addition, as the Secretary's duly authorized representative, Reclamation administers all actions pertaining to the establishment of water service contracts on the Secretary's behalf. In 1998 (prior to the development of Alternative 2), Reclamation officially transferred operation and maintenance responsibility for the majority of the south-of-Delta project facilities to the San Luis and Delta-Mendota Water Authority.

The Reclamation Project Act of 1939 provided for the repayment of construction charges and authorized the sale of CVP water to municipalities and other public corporations and agencies, plant investment, and certain irrigation water deliveries to leased lands.

The Reclamation Project Act of 1956 provided that the Secretary include the provision for contract renewal, upon request of the other party, of any long-term contract for municipal, domestic, or industrial water supply. The contract renewal would be subject to the renegotiation of (1) the charges set forth in the contract in light of circumstances prevailing at the time of renewal and (2) any other matters with respect to which the right to

renegotiate is reserved in the contract. This act also states that the Secretary shall, upon request, provide in any such long-term contract that during the term of the contract and of any renewal (subject to fulfillment of other obligations), the other party to the contract shall have a first right to a stated share or quantity of the CVP water supply that is available for municipal, domestic, industrial, or irrigation use.

The Reclamation Project Act of 1956 provided the right of renewal of long-term repayment or water service contracts for agricultural contractors for a term not to exceed 40 years. The Reclamation Project Act of 1963 provided the right of renewal of long-term repayment or water service contracts for M&I contractors.

BASIS OF DELTA-MENDOTA CANAL UNIT WATER SERVICE CONTRACT RENEWALS

The Central Valley Project Authorization Act of 1937 authorized the construction of CVP project features for navigation, flood control, and water storage; construction of distribution systems; and hydropower generation. The Rivers and Harbors Act of 1940 further authorized the construction of CVP facilities and mandated that dams and reservoirs be used first for river regulation, improvement of navigation, and flood control; second for irrigation and domestic uses; and third for power. This authorization was reauthorized and supplemented by the American River Division Authorization Act of 1949, the Trinity River Act of 1955, the San Luis Authorizing Act of 1960, the Rivers and Harbors Act of 1962, the Auburn-Folsom South Unit Authorization Act of 1967, and the San Felipe Division Authorization Act of 1967 (Reclamation and Service 1999). The CVP facilities include reservoirs on the Trinity, Sacramento, American, Stanislaus, and San Joaquin Rivers and conveyance facilities throughout northern and central California.

The DMC Unit is part of the Delta Division of the CVP. The Delta Division provides for the transport of water through the central portion of the Central Valley, including the Delta. It acts as a hub around which the CVP revolves. The Delta Division is complex in its operations, and all features do not operate in conjunction with one another. The Delta Division facilities provide for the conveyance of water through both the Bay-Delta and the Sacramento-San Joaquin River Delta (Delta) and provide for the delivery of water to CVP contractors in both eastern Contra Costa County and the San Joaquin Valley. The Contra Costa Canal transports water to Contra Costa County. The Delta Cross Channel moves water from the Sacramento River through an excavated channel and natural channels to the Tracy Pumping Plant, which then pumps water into the Delta-Mendota Canal. The Delta-Mendota Canal then delivers water to the west side of the San Joaquin Valley, ending at the Mendota Pool, 30 miles west of the City of Fresno.

Not including the Exchange Contractors,[1] 24 contractors currently receive water from the Delta-Mendota Canal. These 24 contractors include four contractors (Pacheco Water District, Panoche Water District, San Luis Water District, and Westlands Water District) with long-term water service contracts that are also served from facilities that are part of the San Luis Unit.[2] The total Delta-Mendota Canal deliveries to these four contractors may vary, depending upon scheduling between facilities. Over the past five years, only Panoche Water District and San Luis Water District have received deliveries from the Delta-Mendota Canal; these deliveries have averaged approximately 17,653 acre-feet over the past five years (Reclamation 2004). Total deliveries from the Delta-Mendota Canal have averaged 415,414 acre-feet over the past five years. The remaining 20 contractors receiving water from the Delta-Mendota Canal are considered in this EA. Water deliveries are made pursuant to the long-term water service contracts or to the interim renewals of such contracts entered into pursuant to CVPIA Section 3404(c)(1). These 20 contractors are:

- Banta-Carbona Irrigation District
- Broadview Water District
- Centinella Water District
- City of Tracy
- Coehlo Family Trust
- Del Puerto Water District
- Eagle Field Water District
- Fresno Slough Water District
- James Irrigation District
- Laguna Water District
- Mercy Springs Water District
- Oro Loma Water District
- Patterson Water District
- Plain View Water District[3]
- Reclamation District 1606
- The West Side Irrigation District
- Tranquillity Irrigation District
- Tranquillity Public Utilities District
- West Stanislaus Water District
- Widren Water District

[1] Exchange Contractors are contractors who had previous San Joaquin River water rights that are now supplied by Reclamation.

[2] The renewals of long-term water service and repayment contracts for these four districts, the California Department of Fish and Game, and the cities of Avenal, Coalinga, and Huron are analyzed under separate cover in the San Luis Unit Environmental Impact Statement (Reclamation 2004, in process).

[3] Since the writing of this EA, Plain View Water District has merged with Byron-Bethany Irrigation District. Consequently, Plain View Water District no longer exists as a legal entity. Byron-Bethany Irrigation District will execute the proposed water service contract for water service to the lands previously with Plain View Water District. Because this EA was prepared prior to the merger, both districts are analyzed separately.

A description of each of the 20 contractors and a discussion of their individual CVP allocations and the status of the existing long-term contracts are included in Section 3.1 of this EA.

RELATION TO THE CVPIA PEIS

The CVPIA PEIS provided a programmatic evaluation of the impacts of implementing the CVPIA (Reclamation and Service 1999). Four alternatives, 17 supplemental analyses, the Preferred Alternative, and a No-Action Alternative were evaluated in the PEIS. The impact analyses in the PEIS were completed at a sub-regional level, but presented within the PEIS on a regional basis for the Sacramento Valley, San Joaquin Valley, and Tulare Lake regions. The PEIS No-Action Alternative assumed that existing long-term water service contracts would be renewed under the same terms as expiring contracts. The CVPIA PEIS included a Preferred Alternative that addressed the regional impacts and benefits of the general method that Reclamation anticipated for implementation of the CVPIA, including long-term contract renewal.

Following completion of the PEIS, Reclamation is preparing additional environmental documentation for the renewal of long-term water service and repayment contracts, including this EA, which addresses specific impacts relating to contract renewals within the DMC Unit of the Delta Division.

STUDY AREA

The study area for this EA includes portions of Fresno, Merced, San Joaquin, and Stanislaus Counties. The study area is further defined as including the service areas of the 20 DMC Unit contractors listed above.

CONTRACT PERIOD

The term for agricultural (irrigation) water service contracts will be 25 years, the term for mixed agricultural/M&I water service contracts will be 25 years, and the term for M&I-only long-term water service contracts will be 40 years.

The analysis for this EA was conducted for projected conditions to the year 2030, which will extend through the first period of renewal for the 25-year long-term water service contracts. No interim time period conditions were considered or evaluated with respect to build-out conditions or changes in the CVP contract.

PUBLIC INVOLVEMENT PROCESS

Reclamation started the preparation of this EA during the scoping phase. Scoping served as a fact-finding process that helped identify public concerns and recommendations about the NEPA process, issues that would be addressed in this EA, and the scope and level of detail for analyses. Scoping activities began in October 1998 after Reclamation issued a Notice of Intent to prepare the environmental documents on the long-term contract renewal of CVP water service and repayment contracts.

The long-term contract renewal process was conducted as a public process. Throughout the contract renewal process, meetings were held with the contractors, other agencies, interest groups, and the public. Issues raised during the public involvement process were addressed in the negotiation process and were used in the preparation of this EA. A more detailed discussion of the public involvement process is provided in Chapter 5 of this EA.

EFFECTS OF RELATED ACTIVITIES ON WATER SUPPLY RELIABILITY SOUTH OF THE DELTA

Reclamation is implementing several activities as part of its obligation to manage and operate the CVP. In addition to the CVPIA implementation, several related activities continue to affect Reclamation's ability to deliver water to areas south of the Delta. For instance, delivery of water to the DMC Unit begins with controlled releases of water from Shasta Reservoir, followed by activities in the Delta that ultimately result in deliveries to the DMC Unit contractors. However, these and several other related activities north of and within the Delta continue to affect and often constrain Reclamation's ability to deliver water south of the Delta. In order to better understand how these related activities could affect south-of-Delta deliveries, it is helpful to first review DMC Unit facilities and operations that depend on water originating north of the Delta. This section then summarizes the general goals of CVPIA implementation, which shows how many CVPIA activities potentially affect south-of-Delta deliveries. This is followed by an examination of the agreements, water rights processes, decisions, policies, operations, and facilities that can affect south-of-Delta deliveries. This section is intended to provide a sense of the range and magnitude of competing demands on north-of-Delta and Delta water supply, and their general effects on south-of-Delta deliveries. On February 17, 2004, in testimony to the Senate Committee on Agriculture and Water Resources, the Executive Director of the San Luis and Delta-Mendota Water Authority cited the implementation of three federal statutes (the Endangered Species Act, the CVPIA, and the Clean Water Act) as having significantly rededicated water historically used by the south-of-Delta CVP agricultural contractors to other purposes and noted that the reliability of water supplies for the 24 south-of-Delta CVP agricultural service contractors went from 92 percent on average in

1991 to around 50 percent under the regulatory baseline described in the CALFED Record of Decision (discussed below). Several future operational activities have a bearing on south-of-Delta reliability, as reviewed below.

IMPLEMENTATION OF THE CVPIA

The renewal of DMC Unit long-term contracts is being carried out in parallel with the implementation of the CVPIA. A fundamental understanding of the CVPIA is therefore important to understanding the contract renewal process. Reclamation's evolving mission was written into law on October 30, 1992, with the passage of Public Law 102-575, the Reclamation Projects Authorization and Adjustment Act of 1992. Included in the law was Title XXXIV, the CVPIA. The CVPIA amended previous authorizations of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic water supply uses, and fish and wildlife enhancement as having an equal priority with power generation. Among the changes mandated by the CVPIA are:

- Dedicating 800,000 acre-feet annually to fish, wildlife, and habitat restoration.
- Authorizing water transfers outside the CVP service area.
- Implementing an anadromous fish restoration program.
- Creating a restoration fund financed by water and power users.
- Providing for the Shasta Temperature Control Device.
- Implementing fish passage measures at Red Bluff Diversion Dam to increase the CVP yield.
- Mandating firm water supplies for Central Valley wildlife refuges.
- Meeting federal trust responsibility to protect fishery resources (Trinity River).

The CVPIA is being implemented on a broad front. The CVPIA PEIS analyzes projected conditions in 2022, 30 years from the CVPIA's adoption in 1992. It was released in October 1999, and the CVPIA Record of Decision was signed on January 9, 2001.

Operations of the CVP reflect provisions of the CVPIA, particularly Sections 3406(b)(1), (b)(2), and (b)(3). The Department of the Interior's (Interior) Decision on Implementation of Section 3406(b)(2) of the CVPIA (October 5, 1999) (Interior 2003) provides the basis for implementing upstream and Delta actions affecting CVP delivery capability.

DELTA-MENDOTA CANAL UNIT FACILITIES AND OPERATIONS

The CVP supply for the DMC Unit contractors originates as uncontrolled and controlled releases of water from north of the Delta reservoirs including Shasta, Trinity, Folsom and others that is then transported down various rivers to the south Delta. The Delta Cross Channel then transfers this CVP water to the Tracy Pumping Plant in the southern end of the Delta. The Tracy Pumping Plant then lifts the water into the Delta-Mendota Canal, which delivers water to the CVP contractors. The CVP water also can be conveyed to the San Luis Reservoir for deliveries to CVP contractors that divert from the San Luis Canal. San Luis Reservoir conveyances and the diversions directly from the Delta-Mendota Canal by certain contractors in the San Luis Unit are described in detail in the draft environmental impact statement for the San Luis Unit, which will be available under separate cover. The remainder of this discussion describes the primary facilities and operations of the DMC Unit of the Delta Division. Section 3.1 of this EA includes a map (Figure 3.1-1) of the DMC Unit.

DELTA CROSS CHANNEL

The Delta Cross Channel is a 1.2-mile-long, controlled diversion channel between the Sacramento River and the Mokelumne River. At the north end of the Delta, the Delta Cross Channel combines with several natural channels that carry the water approximately 50 miles to the Tracy Pumping Plant. Reclamation believes that the Delta Cross Channel and the training works in the San Joaquin River are necessary to prevent lesser quality water in the San Joaquin River from getting into the Tracy Pumping Plant.

To hold off saltwater intrusion in the Delta and to dilute local pollution, the Delta Cross Channel draws fresh water from the Sacramento River to the Mokelumne River. The diversion also provides an adequate supply of water to the Delta-Mendota Canal and improves irrigation supplies in the Delta. During high water, Reclamation closes the control gates of the channel to prevent flood stages in the San Joaquin section of the Delta. Gates are reopened after the flood danger passes to allow Sacramento River water through to the Tracy Pumping Plant. The Delta Cross Channel is also operated to improve conditions for out-migrating chinook salmon and steelhead trout.

TRACY PUMPING PLANT

Construction of the Tracy Pumping Plant, which consisted of an inlet channel, pumping plant, and discharge pipes, was completed in 1951. Water received from the Delta is lifted 197 feet, pumped through discharge pipes, and carried approximately one mile up an inclined grade to the Delta-Mendota Canal. The power to run the pumps is supplied by CVP power plants. The Delta-Mendota Intake Channel, an earth-lined section approximately 2.5 miles long, also includes a fish screen that was built to intercept

downstream migrant fish so that they may be returned to the main channel to resume their journey to the ocean.

DELTA-MENDOTA CANAL

The Delta-Mendota Canal, the second largest of the CVP waterways, was completed in 1951. It includes a combination of both concrete-lined and earth-lined sections and is about 117 miles in length. It carries water southeasterly from the Tracy Pumping Plant along the west side of the San Joaquin Valley for irrigation supply, for use in the DMC Unit, and to replace San Joaquin River water stored behind Friant Dam and used in the Friant-Kern and Madera Canals. The canal transports water from the Tracy Pumping Plant to the Mendota Pool, which is controlled by a concrete storage dam that was constructed in 1919. The Mendota Pool is located at the confluence of the San Joaquin River and the north fork of the Kings River, approximately 30 miles west of the City of Fresno.

MAJOR AGREEMENTS AND PROCESSES AFFECTING CVP AND DELTA OPERATIONS

The agreements and understanding that most broadly govern Reclamation's capabilities to supply water to the DMC Unit are described below. This section describes the operational characteristics of the following major ongoing activities affecting DMC Unit water supply reliability:

- CVP water rights
- State Board water rights process
- State Water Resources Control Board Decision 1641 (D-1641)
- CALFED Agreements
- Environmental Water Account (EWA)
- Trinity River Division operations
- CVPIA Section 3406(b)(2)
- Coordinated Operations Agreement (COA)
- Operations Criteria and Plan (OCAP)
- Joint Point of Diversion (JPOD)

- Freeport Regional Water Project
- San Joaquin River Agreement/Vernalis Adaptive Management Plan (VAMP)
- Tracy Fish Facility Improvement Program
- South Delta Improvements Project
- Delta-Mendota Canal/California Aqueduct Intertie
- Conformed Place of Use
- Water transfers
- North-of-Delta Offstream Storage Project
- Grasslands Bypass Project (GBP)

These water rights, State Board decisions, and joint agreements with the California Department of Water Resources (DWR) and other agencies define general parameters and guidelines for CVP operations and for coordination with other entities. Trinity River operations are discussed in this section because of their impact on inflows to the Delta and, therefore, on the volume of water available for export.

The COA and the OCAP are presented last in this sequence of agreements and understandings because they present guidelines for actual operation of CVP facilities that are designed to conform to the requirements of other agreements and initiatives, both actual and anticipated. Therefore, both the COA and the OCAP are important points of reference for assessing the impact of related projects on water supply reliability to the DMC Unit.

CVP WATER RIGHTS

Federal law provides that Reclamation obtain water rights for its projects and administer its projects pursuant to state law relating to the control, appropriation, use, or distribution of water used in irrigation, unless the state law is inconsistent with expressed or clearly implied Congressional directives. See 43 USC 383; *California v. United States*, 428 USC 645, 678 (1978); *appeal on remand*, 694 F.2d 117 (1982). Reclamation must operate the CVP in a manner that does not impair senior or prior water rights.

Reclamation has been issued water rights to appropriate water for the CVP by the State Board. Many of the rights for the CVP were issued pursuant to the State Board's

Decision 990, adopted in February 1961. Several other decisions and State Board actions cover the remaining rights for the CVP. These rights contain terms and conditions that must be complied with in the operation of the CVP. Over time, the State Board has issued further decisions that modify the terms and conditions of CVP water rights. In August 1978, it adopted the Water Quality Control Plan for the Delta and Suisun Marsh (WQCP), which established revised water quality objectives for flow and salinity in the Delta and Suisun Marsh. In its Decision 1485 (D-1485), also adopted in August 1978, the State Board required Reclamation and DWR to operate the CVP and State Water Project (SWP) to meet all of the 1978 WQCP objectives, except some of the salinity objectives in the southern Delta. In addition, the State Board's November 1983 Decision 1594 and it February 1984 Order WR 8402 defined Standard Permit Term 91 to protect CVP and SWP stored water from diversion by others. Permit terms and requirements, as they relate to operations, are discussed in the OCAP. In 1991, the State Board adopted a water quality control plan that superseded parts of the 1978 WQCP, but did not revise the DWR's and Reclamation's water rights to reflect the objectives in the 1991 plan.

On May 22, 1995, the State Board adopted a water quality control plan for the Bay-Delta estuary (1995 Bay-Delta Plan). The 1995 Bay-Delta Plan superseded both the 1978 and 1991 plans. On December 29, 1999, the State Board adopted (and then revised on March 15, 2000) D-1641, amending certain terms and conditions of the water rights of the SWP and CVP. D-1641 substituted certain objectives adopted in the 1995 Bay-Delta Plan for water quality objectives required to be met as terms and conditions of the water rights of the SWP and CVP.

STATE BOARD WATER RIGHTS PROCESS

The purpose of the State Board's water rights process for Delta water quality and quantity was to develop a methodology to provide adequate flows to meet the Bay-Delta Plan Accord. The State Board evaluated several alternatives that would require different agencies, including the CVP and the SWP, to release water in a manner that would protect Delta quality.

This process increased the amount of water provided by other water rights holders to meet water quality standards for the Bay-Delta, but it was anticipated that the impacts to the CVP water supply would not be more severe than the impacts presented in the CVPIA PEIS (Reclamation and USFWS 1999) and this EA. Consequently, the operations of upstream projects changed to comply with water quality standards set forth in D-1641. In modeling for the CVPIA PEIS and this EA, it was assumed that the Bay-Delta Plan Accord criteria would be the long-term plan for the Delta. If instream flows provided by the other water rights holders increase, some portion of the environmental flows required by the

CALFED Ecosystem Restoration Program could be satisfied by this water rights process, which may reduce the amount of water that the program needs to acquire from willing sellers. It may also reduce the amount of water that the program needs to develop or may allow the developed water to be used more effectively in meeting program objectives. Any additional demand on water right holders could decrease the amount of water available for transfer.

STATE WATER RESOURCES CONTROL BOARD DECISION 1641

The State Board imposes a myriad of constraints upon the operations of the CVP and SWP in the Delta. With D-1641, it implemented the objectives set forth in the 1995 Bay-Delta Plan, imposed flow and water quality objectives upon the CVP and SWP to ensure the protection of beneficial uses in the Delta, and granted conditional changes to points of diversion for each project.

The various flow objectives and export constraints are designed to protect fisheries. These objectives include specific outflow requirements throughout the year, specific export constraints in the spring, and export limits based on a percentage of estuary inflow throughout the year. The water quality objectives are designed to protect agricultural, M&I, and fishery uses and vary throughout the year and by the wetness of the year.

On December 29, 1999, the State Board adopted and then revised (on March 15, 2000) D-1641, amending certain terms and conditions of the water rights of the SWP and CVP. D-1641 substituted certain objectives adopted in the 1995 Bay-Delta Plan for water quality objectives that had to be met under the water rights of the SWP and CVP. In effect, D-1641 obligates the SWP and CVP to comply with the objectives of the 1995 Bay-Delta Plan. The requirements in D-1641 address the standards for fish and wildlife protection, M&I water quality, agricultural water quality, and Suisun Marsh salinity. D-1641 also authorizes the SWP and CVP to jointly use one another's points of diversion in the southern Delta, with conditional limitations and required response coordination plans. D-1641 modified the Vernalis salinity standard under State Board Decision 1422 to the corresponding Vernalis salinity objective in the 1995 Bay-Delta Plan.

CALFED Agreements

In the August 28, 2000 CALFED Bay-Delta Program (CALFED) Record of Decision, Reclamation and other state and federal agencies committed to implementing a long-term plan to restore the Bay-Delta. The plan consists of many activities including storage, conveyance, ecosystem restoration, levee integrity, watersheds, water supply reliability, water use efficiency, water quality, water transfers, and science.

COORDINATED WATER OPERATIONS

The Implementation Memorandum of Understanding, signed on August 28, 2000, memorialized the operations decision-making process that had evolved through the CALFED Operation Coordination Group (Ops Group) process, including the Operations Decision Making Process (Attachment D of the Record of Decision). This process consists of staff-, stakeholder-, and policy-level forums for addressing operational issues.

One of these forums, the Water Operations Management Team, consists of managers from Reclamation, the Service, NOAA Fisheries, the California Department of Fish and Game (CDFG), DWR, and the U.S. Environmental Protection Agency (USEPA). This team provides a frequent opportunity for managers to discuss CVP and SWP operations and related fishery issues.

The Ops Group was established by the 1994 Framework Agreement. The Ops Group (consisting of Reclamation, the Service, DWR, CDFG, the State Board, NOAA Fisheries, and USEPA) coordinates the operation of the projects with fisheries protection and implementation of the CVPIA. Shortly after its formation, the Ops Group provided a forum for stakeholders to provide input into the operations decision process, data exchange, and information dissemination. The CVPIA Section 3406(b)(2) Implementation Team assists Interior with the implementation of CVPIA Section 3406(b)(2). The Data Assessment Team is an agency-driven group that includes stakeholder participation to review biological data and provide input to Reclamation and DWR on actions to protect fish. The Operations and Fisheries Forum, which has been meeting since 1995, is a stakeholder-driven forum to aid in information dissemination and to facilitate discussion regarding operation of the CVP and SWP.

The Ops Group developed and implemented the Chinook Salmon Protection Decision Process. The process includes monitoring of environmental conditions and salmon movement, data assessment procedures, specific indicators that spring-run chinook salmon are entering the Delta from upstream or being entrained at the SWP or CVP export facilities, and operational responses to minimize the effects of SWP and CVP facilities on emigrating spring-run salmon. The Ops Group's decision-making process is also used to protect other chinook salmon runs.

ENVIRONMENTAL WATER ACCOUNT

The EWA consists of two primary elements:

- Assisting fish population recovery for at-risk native fish species.

- Increasing water supply reliability by reducing uncertainty associated with fish recovery actions.

As specified in the CALFED Record of Decision, the EWA was implemented to provide sufficient water and has been combined with the Ecosystem Restoration Program to address CALFED's fish protection, restoration, and recovery needs, while enhancing the predictability of CVP and SWP operations and improving the confidence in and reliability of water allocation forecasts. In the Delta environment, EWA resources and operational flexibility are used as both a real-time fish management tool to improve the passage and survival of at-risk fish species in the Delta environment and for specific seasonal planned fish protection operations at the CVP and SWP Delta pumps.

The EWA agencies, which include Reclamation, the Service, NOAA Fisheries, DWR, and CDFG, have established protocols for the expenditure of water resources following the guidance given in the CALFED Record of Decision. EWA resources may be used to temporarily reduce SWP Delta exports at Banks Pumping Plant for fish protection purposes above D-1641 requirements and to coordinate with the implementation of Section 3406(b)(2) fish actions pursuant to the CVPIA. EWA resources also may be used to temporarily reduce CVP Tracy Pumping Plant export for fish protection purposes in addition to the resources available through Section 3406(b)(2) of the CVPIA.

The EWA described in the CALFED Record of Decision is a four-year program, which the EWA agencies have been implementing since 2000. However, the EWA agencies believe a long-term EWA is critical to meet the CALFED Record of Decision goals of increased water supply reliability to water users, while at the same time ensuring the availability of sufficient water to meet fish protection, restoration, and recovery needs. Thus, the EWA agencies envision implementation of a long-term EWA as part of the operation of the CVP and SWP. Future implementation of a long-term EWA is subject to NEPA and the California Environmental Quality Act (CEQA).

The commitment to not reduce project water deliveries resulting from EWA actions to benefit fish is predicated on three tiers of protection described in the CALFED Record of Decision.

The CALFED Record of Decision establishes EWA purchased (fixed) asset targets at 185,000 acre-feet, with 35,000 acre-feet coming from sources upstream of the Delta and 150,000 acre-feet coming from sources south of the Delta or the functional equivalent of these assets. In reality, more water is available for transfer from areas upstream of the Delta, and at a lower cost, than from areas south of the Delta.

If the amount of water being transferred from SWP contractors from upstream of the Delta increases, then the SWP's capacity to convey EWA water will decrease. In addition, the conveyance of the Sacramento Valley Water Management Agreement settlement water supplies for SWP contractors will also decrease the SWP's conveyance capacity for EWA water. Transfers under this agreement are expected to begin no sooner than 2005. Because SWP allocations are unknown when contracts are being negotiated, EWA contracts will use options for part of the purchases upstream of the Delta or contract provisions tied to SWP allocation to accommodate uncertainty over conveyance capacity. Water purchases south of the Delta can be tied directly to SWP allocations in many instances. The EWA and the EWA Operating Principles Agreement have recently been extended through December 31, 2007, in a memorandum of understanding by and between Reclamation, the Service, NOAA Fisheries, CDFG, and DWR.

TRINITY RIVER DIVISION OPERATIONS

The Trinity River Division, completed in 1964, includes facilities to store and regulate water in the Trinity River, as well as facilities to divert water to the Sacramento River basin. Trinity Dam is located on the Trinity River and regulates the flow from a drainage area of approximately 720 square miles. The dam was completed in 1962, forming Trinity Lake, which has a maximum storage capacity of approximately 2.4 million acre-feet. The mean annual inflow to Trinity Lake from the Trinity River is about 1.2 million acre-feet per year. Historically, an average of about two-thirds of the annual inflow has been diverted to the Sacramento River basin (1991–2003). Trinity Lake stores water for release to the Trinity River and for diversion to the Sacramento River via Lewiston Reservoir, Carr Tunnel, Whiskeytown Reservoir, and Spring Creek Tunnel, where it commingles in Keswick Reservoir with Sacramento River water released from both Shasta Dam and the Spring Creek Debris Dam.

Since 1964, a portion of the flow from the Trinity River basin has been exported to the Sacramento River basin through CVP facilities. Exporting Trinity River water to the Sacramento River basin provides increased water supply for the CVP and is a major source of CVP power generation. The amounts and timing of the Trinity River exports are determined after consideration is given to the forecasted available Trinity River water supply and Trinity River in-basin needs, including carryover storage. Trinity River exports are also a key component of water temperature control operations on the upper Sacramento River.[4]

[4] DWR's 1991 Drought Water Bank purchased over 800,000 acre-feet and conveyed approximately 470,000 acre-feet of purchased water across the Delta.

The Trinity River Diversion diverts water from the Trinity River at Lewiston Dam via the Clear Creek Tunnel and passes this flow through the Judge Francis Carr Powerhouse as it is discharged into Whiskeytown Lake on Clear Creek. Whiskeytown Lake is normally operated to:

- Regulate inflows for power generation and recreation.
- Support upper Sacramento River temperature objectives.
- Provide releases to Clear Creek consistent with the objectives of the CVPIA's Anadromous Fish Restoration Program. Although Whiskeytown Lake stores up to 241,000 acre-feet, this storage is not normally used as a source of water supply.

From Whiskeytown Lake, water is released through the Spring Creek Power Conduit to the Spring Creek Power Plant and into Keswick Reservoir. All of the water diverted from the Trinity River, plus a portion of Clear Creek flows, is diverted through the Spring Creek Power Conduit into Keswick Reservoir. Actual instream flows below Whiskeytown Dam to Clear Creek are determined in accordance with Interior's Decision on Implementation of Section 3406(b)(2) of the CVPIA (Interior 2003). Instream flow objectives below Whiskeytown Dam are based on recommendations from the Service, NOAA Fisheries, and the CDFG pursuant to annual CVPIA Section 3406(b)(2) Implementation Team coordination. Typical annual instream fishery considerations in Clear Creek include spawning flows for fall-run chinook salmon as well as water temperatures in summer for steelhead and in late summer for spring-run chinook salmon.

Temperature control objectives for the Trinity River are set forth in the State Board's Water Rights Order 90-5. Temperature objectives vary by reach and by season. Between Lewiston Dam and the Douglas City bridge, the daily average temperature should not exceed 60° Fahrenheit (F) from July 1 to September 14, and 56°F from September 15 to October 1. From October 1 to December 31, the daily average temperature between Lewiston Dam and the confluence of the North Fork Trinity River should not exceed 56°F. Reclamation consults with the Service to establish a schedule of releases from Lewiston Dam that can best achieve these objectives.

To increase CVP water supply, export volumes from the Trinity River are made in coordination with the operation of other CVP water supply reservoirs, generally based on reservoir refill potential and CVP Delta export water demand. Other important considerations affecting the timing of Trinity River exports are based on the utility of power generation and allowances for normal maintenance of the diversion works and generation facilities.

Trinity River Flow Evaluation Study

The Trinity River Flow Evaluation Study (TRFES), begun by the Service in 1983, evaluated four annual flow volumes: 140,000 acre-feet, 220,000 acre-feet, 287,000 acre-feet, and 340,000 acre-feet. Flow evaluation studies were conducted annually between 1983 and 1994 by Service biologists. The TRFES report (Service and Hoopa Valley Tribe 1999) concluded that the flow alternatives identified for study in the 1981 Secretarial decision did not meet the biological and geomorphic habitat requirements necessary to restore naturally produced salmonid populations in the main stem of the Trinity River. The TRFES recommended specific annual flow releases, sediment management, and channel rehabilitation to create and sustain a dynamic alluvial channel that would provide the necessary habitat.

The Preferred Alternative agreed to by the Secretary and the Hoopa Valley Tribal Council in the Record of Decision for the Trinity River Main Stem Fishery Restoration EIS/EIR (Interior 2000) adopted the recommendations contained in the TRFES. The Preferred Alternative is the Flow Evaluation Alternative, which includes increased variable instream flow releases from Lewiston Dam, a coarse sediment introduction program, 47 new channel projects (mechanical channel rehabilitation), an adaptive management program, and a watershed restoration program. The total volume of water recommended for release from the Trinity River Division to the Trinity River ranged between approximately 369,000 acre-feet and 815,000 acre-feet, depending on the annual hydrology (water-year type) as determined on April 1 of each year. The recommended flow regimens link two essential purposes deemed necessary to restore and maintain the Trinity River's fishery resources: (1) flows to provide physical fish habitat (i.e., appropriate depths and velocities and suitable temperature regimes for anadromous salmonids) and (2) flows to restore the riverine processes that create and maintain the structural integrity and spatial complexity of the fish habitats.

Based on the Record of Decision (Interior 2000), 368,000 acre-feet are allocated annually for Trinity River flows. Due to ongoing litigation on the Record of Decision, the Federal District Court for the Eastern District of California issued an order on December 10, 2002, that directed the CVP to release 368,000 acre-feet during critical Trinity River inflow years and 453,000 acre-feet under all other conditions. A July 2004 opinion by the Ninth Circuit Court approved the federal plan to implement the congressional mandate to increase flows into the Trinity River to restore fish habitat. The plan calls for diverting from 368,900 acre-feet to 815,200 acre-feet annually, depending on the annual hydrology. This amount is scheduled in coordination with the Service to best meet habitat, temperature, and sediment transport objectives in the Trinity River basin.

CVPIA SECTION 3406(B)(2)

On May 9, 2003, Interior issued its Decision on Implementation of Section 3406(b)(2) of the CVPIA (Interior 2003). Dedication of Section 3406(b)(2) water occurs when Reclamation takes a fish or wildlife habitat restoration action based on the Service's recommendations (and in consultation with NOAA Fisheries and CDFG), pursuant to the primary purpose of Section 3406(b)(2)—to contribute to the Anadromous Fish Restoration Program's flow objectives for CVP streams. Dedication and management of Section 3406(b)(2) water may also assist in meeting the fishery objectives of the 1995 bay-Delta Plan and helps meet the needs of fish listed as threatened or endangered since the enactment of the CVPIA.

Interior's decision describes how the amount of dedicated Section 3406(b)(2) water is determined. Planning and accounting for Section 3406(b)(2) actions are done cooperatively and occur primarily through weekly meetings of the CVPIA Section 3406(b)(2) Implementation Team (discussed above under CALFED Agreements, Coordinated Water Operations). Actions usually take one of two forms: in-stream augmentation below CVP reservoirs or reductions in CVP Tracy Pumping Plant pumping in the Delta.

The implementation of Section 3406(b)(2) has resulted in a shift in the rates and timing of CVP reservoir releases to protect anadromous fish. This has reduced the CVP water supply and, at times, enhanced the SWP water supply because of the provisions of Articles 6(h) and 6(i) of the COA. The CVPIA led to Refuge Water Supply contracts, which, for Sacramento Valley refuges, may increase the amounts of water delivered annually. These additional deliveries were not part of the COA. The additional refuge supplies, if treated as Sacramento Valley in-basin uses, may, at times reduce the CVP and SWP supply available for Delta export.

COORDINATED OPERATIONS AGREEMENT

The CVP and the SWP use a common water supply in the Central Valley of California. The DWR and Reclamation have built water conservation and water delivery facilities in the Central Valley that deliver water supplies to affected water rights holders as well as project contractors. The State Board places conditions on the DWR's and Reclamation's water rights to protect the beneficial uses of water within each respective project and jointly for the protection of beneficial uses in the Sacramento Valley and the Sacramento-San Joaquin Delta Estuary. Reclamation and DWR operate the CVP and SWP to meet these requirements through the COA.

The COA defined the project facilities and their water supplies and sets forth procedures for:

- Coordinating operations.
- Identifying formulas for sharing joint responsibilities for meeting Delta standards and other legal uses of water.
- Identifying how unstored flow will be shared.
- Setting up a framework for exchange of water and services between the CVP and SWP.
- Providing for a five-year review.

The CVP and SWP use the Sacramento River and the Delta as common conveyance facilities. Reservoir releases and Delta exports must be coordinated to ensure that each project achieves its share of benefits from shared water supplies and bears its share of joint obligations to protect beneficial uses.

Obligations for In-Basin Uses

In-basin uses are defined in the COA as legal uses of water in the Sacramento Basin, including the water required under the D-1485 Delta standards (D-1485 ordered the CVP and SWP to guarantee certain conditions for water quality protection for agricultural, M&I, and fish and wildlife uses). Each project is obligated to ensure that water is available for these uses, but the degree of obligation is dependent on several factors and changes throughout the year.

Balanced water conditions are defined in the COA as periods when it is agreed that releases from upstream reservoirs plus unregulated flows approximately equal the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses plus exports. Reclamation's Central Valley Operations Office and DWR's SWP Operations Control Office jointly decide when balanced or excess water conditions exist.

During excess water conditions, sufficient water is available to meet all beneficial needs, and the CVP and SWP are not required to supplement the supply with water from reservoir storage. Under Article 6(g), Reclamation and DWR have the responsibility (during excess water conditions) to store and export as much water as possible, within physical and contractual limits. In these cases, accountability is not required. However, during balanced water conditions, the CVP and SWP share the responsibility in meeting in-basin uses. Balanced water conditions are further defined according to whether water from

upstream storage is required to meet Sacramento Valley in-basin use or unstored water is available for export.

When water must be withdrawn from reservoir storage to meet in-basin uses, 75 percent of the responsibility is borne by the CVP and 25 percent is borne by the SWP. When unstored water is available for export (i.e., Delta exports exceed storage withdrawals while balanced water conditions exist), the sum of CVP stored water, SWP stored water, and the unstored water for export is allocated 55 percent and 45 percent to the CVP and SWP, respectively.

Accounting and Coordination of Operations

Reclamation and DWR coordinate daily to determine target Delta outflow for water quality, reservoir release levels necessary to meet in-basin demands, schedules for joint use of the San Luis Unit facilities, and the use of each other's facilities for pumping and wheeling.

During balanced water conditions, daily accounts are maintained of the CVP and SWP obligations. This accounting allows for flexibility in operations and avoids the necessity of daily changes in reservoir releases that originate several days' travel time from the Delta. It also means adjustments can be made "after the fact" rather than by prediction for the variables of reservoir inflow, storage withdrawals, and in-basin uses.

The accounting language of the COA provides the mechanism for determining the responsibility of each project; however, real time operations dictate actions. For example, conditions in the Delta can change rapidly. Weather conditions, combined with tidal action, can quickly affect Delta salinity conditions and, therefore, the Delta outflow objective. If, in this circumstance, it is decided the reasonable course of action is to increase upstream reservoir releases, then the response will likely be to increase releases from Folsom Lake first. Lake Oroville water releases require about three days to reach the Delta, while water released from Lake Shasta requires five days to travel from Keswick to the Delta. As water from the other reservoirs arrives in the Delta, Folsom Lake releases could be adjusted downward. Any imbalance in meeting each project's obligation would be captured by the COA accounting.

Reservoir release changes are one means of adjusting to changing in-basin conditions. Changes in Delta outflow can also be immediately achieved by increasing or decreasing project exports. As with changes in reservoir releases, imbalances in meeting project obligations are considered in the COA accounting.

During periods of balanced water conditions, when real-time operations dictate project actions, an accounting procedure tracks the water obligations of the CVP and SWP. Each project maintains a daily and accumulated accounting. The account represents the imbalance resulting from actual coordinated operations compared to the COA-defined sharing of obligations and supply. The project that is "owed" water (i.e., the project that provided more or exported less than its COA-defined share) may request that the other project adjust its operations to reduce or eliminate the accumulated account within a reasonable time.

The duration of balanced water conditions varies from year to year. Some very wet years have had no periods of balanced conditions, while very dry years may have had long continuous periods of balanced conditions, and still other years may have had several periods of balanced conditions interspersed with excess water conditions. Account balances continue from one balanced water condition through the excess water condition and into the next balanced water condition. When the project that is owed water enters into flood control operations at Shasta Lake or Lake Oroville, the accounting is zeroed out for that respective project.

Changes in Operations Coordination Environment Since 1986

Implementation of the COA has evolved continually since 1986 as changes have occurred to CVP and SWP facilities, to project operations criteria, and to the overall physical and regulatory environment in which the operations coordination takes place. Since 1986, new facilities that were not part of the original COA have been incorporated into the operations. D-1641 imposed new water quality and flow standards; the CVPIA CVPIAhas changed how the CVP is operated; and finally, the federal Endangered Species Act responsibilities have affected the operations of both the CVP and SWP. The following is a description of significant changes that have occurred since 1986 with respect to the COA. Included after each item is an explanation of how it related to the COA and its general effect on the accomplishments of the CVP and SWP.

Bay-Delta Accord and Subsequent SWRCB Implementation of D-1641

The December 1994 Bay-Delta Accord committed the CVP and the SWP to a set of Delta habitat protection objectives that were eventually incorporated into the 1995 Bay-Delta Plan, and later, along with the VAMP, were implemented by D-1641. The actions taken by the CVP and SWP in implementing D-1641 significantly reduced the export water supply of both projects. Article 11 of the COA describes the options available to the United States for responding to the establishment of new Delta standards.

The first option is to amend the COA to provide for continued implementation to accomplish the purposes of the COA. Although the CVP and SWP continue to be operated in coordination to meet D-1641, neither an amendment of the COA nor an evaluation of the new Delta standards (for consistency with congressional directives) has been undertaken. Significant new elements in the D-1641 standards include (1) the X2 standards, (2) export to inflow ratios, (3) real-time Delta Cross Channel operation, (4) San Joaquin River flow standards, and (5) recognition of the CALFED Ops Group process for flexibility in applying or relaxing certain standards.

Loss of 195,000 Acre-Feet of D-1485 Condition 3 Replacement Pumping

The COA affirmed the SWP's commitment to provide replacement capacity to the CVP to make up for May and June pumping reductions imposed by D-1485 in 1978. In the evolution of COA operations since 1986, D-1485 was superseded, and 1995 Bay-Delta Plan growth and other pumping constraints reduced available surplus capacity. The CVP has not received replacement pumping since 1993. Since then, there have been (and in the current operations environment, there will continue to be) many years in which the CVP will be limited by insufficient Delta export capacity to convey its water supply. The loss of up to 195,000 acre-feet of replacement pumping has diminished the accomplishments anticipated by the CVP under the COA.

Periodic Review of the Coordinated Operations Agreement

Article 14a of the COA specifies the parties to review operations every five years. The Agreement proceeds to state that the parties shall:

- Compare the relative success each party has had in meeting its objectives.
- Review operation studies supporting the COA.
- Assess the influence of Article 6 in meeting each party's future objectives.

Article 14a further states, "The parties shall agree upon revisions, if any, of the factors and procedures in Article 6, Exhibits B and D, and the Operation Study used to develop Exhibit B."

Beginning in 1995 and continuing under D-1641, the CVP and SWP have been operating to meet the revised Delta standards. The changes that have occurred to the CVP and SWP since 1986 suggest a COA review would be appropriate. The August 2000 CALFED Record of Decision included as an implementation commitment that DWR and Reclamation intend to modify the 1986 COA to reflect the many changes in regulatory standards, operating conditions, and new project features (such as the EWA) that have

evolved. Should that process indicate a change in the coordinated operation of the CVP and SWP, a review will be completed to determine the need to reinitiate consultation under Section 7 of the Endangered Species Act.

OPERATIONS CRITERIA AND PLAN

Reclamation and DWR propose to continue to operate the CVP and SWP to divert, store, and convey CVP and SWP water consistent with applicable law. The provisions and requirements of the CVPIA, D-1641, CALFED, and other agency mandates require that the operational roles and responsibilities of the SWP and CVP be reviewed and updated to provide appropriate long-term operating criteria and procedures for the two primary water storage and delivery projects affecting the waterways of the Central Valley.

The OCAP has been prepared to serve as a baseline description of the facilities and operating environment of the CVP and SWP. It identifies many factors influencing the physical and institutional conditions and decision-making process under which the CVP now operates. Regulatory and legal requirements are explained, and alternative operating models and strategies described.

It is envisioned that the OCAP will be used as a reference by technical specialists and policymakers in understanding how the CVP is operated. The OCAP includes numeric and nonnumeric criteria and strategies. Emphasis is given to explaining the analyses used to develop typical operating plans for simulated hydrologic conditions.

The OCAP covers the Trinity River, Shasta, Sacramento River, American River, Delta, West San Joaquin, and Friant Divisions of the CVP. Proposed CVP operational actions for consultation are presented in Table 1-1.

In addition to current-day operations, the following future actions are included in the OCAP:

- Increased flows in the Trinity River system.
- Increased pumping at Banks Pumping Plant (referred to as “8500 Banks”).
- The operation of future permanent operable barriers in the South Delta.
- An intertie between the California Aqueduct and the Delta-Mendota Canal.
- A long-term EWA

Table 1-1
OCAP Actions and Guiding Requirements

Action	Requirement for Action
I. Trinity River Division	
Trinity Lake Operations	State Board Permit Order 124 Safety of Dams Criteria
Lewiston Dam releases and Trinity River flows	State Board permits for diversions from Trinity River 2000 Trinity Record of Decision *Westlands Water District et al., v. Interior* (Trinity litigation)
Whiskeytown Dam releases to Clear Creek	State Board permits for diversions from Trinity River, Clear Creek (permits specify minimum downstream releases) 1960 Memorandum of Agreement with CDFG (establishes minimum flows release to Clear Creek) 1963 release schedule Consistent with Anadromous Fish Restoration Program objectives (Appendix A to the October 5, 1999 Decision on Section 3406(b)(2) availability) Stability Criteria Thresholds of Trinity Storage
Townsend requirement	2000 Agreement with Service re Section 3406(b)(2) water
Spring Creek Debris Dam operations	1980 Memorandum of Agreement with CDFG, State Board
Diversions to Sacramento River	State Board WR 90-5 (temperature control objectives), State Board WR 91-1
Temperature Objectives	State Board WR 90-5, State Board WR 91-1
II. Shasta Division	***State Board WR 90-5***
Shasta Dam Operations	Regulating Criteria-Flood Control Act 1944 CVPIA-Temperature Control Device Operations
Keswick Dam releases to Sacramento River Minimum flows of 3,250 cubic feet per second (cfs) October through March	1960 Memorandum of Agreement with CDFG: established flow objectives, minimum release in dry, critical years 1981 Agreement with CDFG: established normal-year minimum releases September-February State Board WR 90-5: established year-round minimum flows Anadromous Fish Restoration Program (Appendix A to the October 5, 1999 Decision on Section 3406(b)(2) implementation) and Section 3406(b)(2) availability Navigation flow requirement at Wilkins Slough CVPIA: ramping criteria consistent with Section 3406(b)(2) and (b)(9)
III. Sacramento River Division	***State Board WR 90-5***
Red Bluff Diversion Dam Operations Gates raised from September 15 to May 14 with flexibility to temporarily lower gates in excess of pumping capacity Future installation of additional pumps	1986 Agreement with NOAA Fisheries et al., gates raised in winter months for fish passage
Tehama-Colusa Canal Operations	Temporary diversion from Black Butte Reservoir (State Board permit)

Table 1-1
OCAP Actions and Guiding Requirements

Action	Requirement for Action
Sacramento River Temperature objectives	State Board WR 90-5: temperature, objectives added to permits, modified 1960 Memorandum of Understanding with CDFG regarding minimum flows
	State Board WR 91-1 (temperature objectives)
Sacramento-Trinity Water Quality Monitoring Network	State Board WR 9-5, 91-1
Sacramento River Temperature Task Group	State Board 90-5, 91-1
ACID Diversion Dam ops	Reclamation contract (water service and diversion)
IV. American River Division	
Folsom Dam and Power Plant operations	U.S. Army Corps of Engineers Flood Control Manual, Flood Control Diagram (regulating criteria)
	1996 Agreement with Sacramento Area Flood Control Agency (modified flood control criteria)
	Anadromous Fish Restoration Program (Appendix A to the October 5, 1999 Decision on Section 3406(b)(2) implementation and Section 3406(b)(2) availability
	Draft CDFG criteria pursuant to CVPIA Section 3406(b)(9) (addressing flow fluctuations)
	CVP local municipal diversions
Nimbus Dam operations and Lower American River flows	Anadromous Fish Restoration Program and Section 3406(b)(2) availability: minimum flows October-September, stability objectives
Includes year-round temperature control	Draft CDFG criteria pursuant to CVPIA Section 3406(b)(9) (addressing flow fluctuations)
Folsom South Canal operations	Contractual commitments
Freeport Regional Water Project	Contract with East Bay Municipal Utility District
	Sacramento County contract and water rights
V. Eastside Division	
New Melones Dam and Reservoir operations and Lower Stanislaus River flows below Goodwin Dam	U.S. Army Corps of Engineers Flood Control Manual, Flood Control Diagram (New Melones and Tulloch)
	Oakdale Irrigation District, South San Joaquin Irrigation District contract (Tri-dams Agreement for afterbay storage)
	New Melones Interim Plan of Operation (includes Anadromous Fish Restoration Program flows with Section 3406(b)(2) water)
	1988 Oakdale Irrigation District, South San Joaquin Irrigation District Agreement and Stipulation (release of annual inflows for diversion)
	State Board D-1422 (release of 98,000 acre-feet for fish and wildlife purposes, dissolved oxygen standards at Ripon)
	1987 CDFG Agreement (increased flows over State Board D-1422
	1995 WQCP (minimum dissolved oxygen concentration)
	1999 San Joaquin River Agreement flows and water supplies
	CVP Water Service Contracts
Support of San Joaquin River requirements and objectives at Vernalis	State Board D-1641 (Vernalis flow requirements February-June, Vernalis water quality objectives, San Joaquin River Agreement implementation)
	CALFED Record of Decision Regulatory Baseline (2:1 flow/export ratio met with Section 3406(b)(2), EWA)

Table 1-1
OCAP Actions and Guiding Requirements

Action	Requirement for Action
VI. Delta Division	
Tracy Pumping Plant	Salmon Decision Tree
Pumping curtailments supported with Section 3406(b)(2) or EWA assets	CVPIA CALFED Record of Decision and EWA Operating Principles
Delta Cross Channel operation	State Board D-1641 (Delta Cross Channel closure: February-May, 14 days between May 21-June 15, 45 days between November-January Salmon Decision Tree
Contra Costa Canal operations	CVPIA (Fish Screen Program) 1993 Winter-run Chinook Salmon Biological Opinion for Los Vaqueros 1993 Delta Smelt Biological Opinion for Los Vaqueros (requires Old River diversions January-August to the extent possible, diversion reduced during dry conditions, reservoir refilling criteria, reservoir releases in spring)
Export/Inflow ratio	State Board D-1641
X2	State Board D-1641
31-day export limit (Mid-April-Mid-May)	San Joaquin River Agreement-VAMP State Board D-1641
Delta outflow	State Board D-1641 (minimum outflow July-January: 3,000 to 8,000 cfs, habitat protection outflow February-June: 7,100 to 29,200 cfs, February Salinity Starting Condition Determination
Water quality	State Board D-1641 (M&I standards, agricultural standards for western/interior Delta and southern Delta, fish and wildlife standards for San Joaquin River and Suisun Marsh)
JPOD	State Board D-1641
Intertie	CALFED Record of Decision
VII. Friant Division	
Millerton Lake and Friant Dam operations, Friant-Kern Canal operations, and Madera Canal Operations	U.S. Army Corps of Engineers Flood Control Diagram, Mammoth Pool Operating Contract (with Southern California Edison, Water Deliveries [Class I, Class II, and Section 215 supply], SJRWR [flow at Gravelly Ford], Miller and Lux Water Rights exchange)
VIII. West San Joaquin Division	
San Luis Reservoir, Gianelli Pumping and Generating Plant, San Luis Canal, O'Neill Forebay operations, and Dos Amigos Pumping Plant	1961 DWR/Reclamation agreement (as amended) CVP water service contracts and deliveries
IX. San Felipe Division	
Pacheco Pumping Plant, Santa Clara Pipeline, Hollister Conduit, and Coyote Pumping Plant	CVP water service contract and deliveries for Santa Clara Valley Water District and San Benito County
X. Other	
Actions using Section 3406(b)(1), (b)(2)	CVPIA Anadromous Fish Restoration Program 2003 Final Decision on Section 3406(b)(2) Implementation

Table 1-1
OCAP Actions and Guiding Requirements

Action	Requirement for Action
EWA	CALFED Record of Decision and Programmatic Biological Opinions
	EWA Operating Principles
	CVPIA

- Reclamation and DWR are also proposing adjustments in the coordinated operation of the CVP and SWP for conveyance of up to 100,000 acre-feet of Level 2 CVP refuge water at Banks Pumping Plant and use of up to 75,000 acre-feet of CVP water to reduce SWP in-basin Bay-Delta water quality and flow requirements. These increases (from current levels of 50,000 acre-feet and 37,500 acre-feet, respectively) would become effective when increasing the permitted capacity of the SWP Banks Pumping Plant to 8,500 cubic feet per second (cfs) has been achieved, or earlier if agreed to by Reclamation and DWR.

- The Freeport Regional Water Project (FRWP).

- Provision of earlier, higher water allocations to CVP water users by developing and implementing a plan (which may consist of source-shifting strategies) to maintain the minimum storage in the state share of San Luis Reservoir.

To facilitate SWP–CVP integration, DWR and Reclamation will develop and obtain State Board approvals of any needed water level, water quality, and fisheries response plans set forth in D-1641.

The OCAP Endangered Species Act consultation primarily addresses ongoing and historic CVP and SWP operations and several future changes. Reclamation formally consulted on several new actions, such as the Freeport diversion project, the M&I shortage policy, the Trinity River Record of Decision flows, and the Delta-Mendota Canal/California Aqueduct Intertie. There was also early consultation (on actions that are not anticipated to be implemented in the immediate future) on the operation of South Delta Improvement Project (the increase to 8,500 cfs at Banks Pumping Plant and South Delta barrier operations) with assumptions for a long-term EWA. Additional consultation under the Endangered Species Act will be required prior to implementing any actions addressed in the early consultation.

The OCAP consultation is not a decision-making process. In essence, it analyzes the effects of proposed operations on listed species. Decisions on implementing new actions are made in separate project-specific planning and environmental compliance processes.

JOINT POINT OF DIVERSION

D-1641 granted Reclamation and DWR the ability to use or exchange each other's diversion capacity capabilities to enhance the beneficial uses of both the CVP and SWP. The State Board conditioned the use of JPOD capabilities based on staged implementation and conditional requirements for each stage of implementation. The stages of the JPOD in D-1641 are:

- Stage 1 – water service to Cross Valley Canal contractors and Musco Olive, and to recover export reductions taken to benefit fish.
- Stage 2 – for any purpose authorized under the current project water right permits.
- Stage 3 – for any purpose authorized up to the physical capacity of the diversion facilities.

Each stage of the JPOD has regulatory terms and conditions that must be satisfied in order to implement the JPOD.

All stages require a response plan to ensure that water levels in the southern Delta will not be lowered to the injury of water users in the southern Delta (Water Level Response Plan). All stages require a response plan to ensure that the water quality in the southern and central Delta will not be significantly degraded through operations of the JPOD to the injury of water users in the southern and central Delta.

Stage 2 has the additional requirement to complete an operations plan to protect fish and wildlife and other legal users of water. This is commonly known as the Fisheries Response Plan. Stage 3 has the additional requirement to protect water levels in the southern Delta under the operational conditions of the permanent South Delta Barrier program and an updated companion Fisheries Response Plan.

Reclamation and DWR intend to apply all the response plan criteria consistently for JPOD uses as well as water transfer uses.

The priority access to project facilities has been addressed in the CALFED EWA protocols. The Stage 2 CVP JPOD has the same priority of use of excess Banks Pumping Plant capacity as the EWA program. Article 55 of SWP contracts gives the SWP contractors preferential use of excess Banks Pumping Plant capacity. Reclamation, in approving water transfers involving water from CVP water sources, including those that use SWP Article 55, will consider the potential effects on use of the JPOD to move CVP reservoir storage releases.

In general, the JPOD capabilities will be used to accomplish four basic CVP–SWP objectives:

- When wintertime excess pumping capacity becomes available during Delta excess conditions and total CVP–SWP San Luis Reservoir storage is not projected to fill before the VAMP period, the project with the deficit in San Luis Reservoir storage may use the JPOD capabilities. Concurrently, under the CALFED Record of Decision, the JPOD may be used to create additional water supplies for the EWA or reduce debt for previous EWA actions.

- When summertime pumping capacity is available at Banks Pumping Plant and CVP reservoir conditions can support additional releases, the CVP may use the JPOD capabilities to enhance its annual south-of-Delta water supplies.

- When summertime pumping capacity is available at Banks or Tracy Pumping Plant to facilitate water transfers, the JPOD may be used to further facilitate the water transfer.

- During certain coordinated CVP–SWP operation scenarios for fishery entrainment management, the JPOD may be used to maximize CVP–SWP exports at the facility with the least fishery entrainment impact, while minimizing export at the facility with the most fishery entrainment impact.

FREEPORT REGIONAL WATER PROJECT

Reclamation and the Freeport Regional Water Authority (FRWA) are proposing to construct and operate the FRWP, a water supply project to meet regional water supply needs. FRWA, a joint powers agency formed under State law by the Sacramento County Water Agency (SCWA) and East Bay Municipal Utilities District (EBMUD), is the state lead agency, and Reclamation is the federal lead agency.

Reclamation proposes to deliver CVP water, pursuant to its respective water supply contracts with SCWA and EBMUD through the FRWP, to areas in central Sacramento County. The FRWP will have a design capacity of 286 cfs (185 millions of gallons per day [mgd]). Up to 132 cfs (85 mgd) would be diverted under Sacramento County's Reclamation water service contract and other anticipated water entitlements, and up to 155 cfs (100 mgd) of water could be diverted under EBMUD's amended Reclamation water service contract. Under the terms of this amendatory contract, EBMUD can take delivery of Sacramento River water in any year in which EMBUD's March 1 forecast of its October 1 total system storage is less than 500,000 acre-feet. When this condition is met, the amendatory contract entitles EBMUD to take up to 133,000 acre-feet in any three-

consecutive-year period in which its October 1 storage forecast remains below 500,000 acre-feet. EBMUD would take delivery of its entitlement at a maximum rate of 100 mgd (112,000 acre-feet per year). Deliveries would start at the beginning of the CVP contract year (March 1) or any time afterward. Deliveries would cease when EBMUD's CVP allocation for that year is reached, when the 165,000 acre-feet limitation is reached, or when EBMUD no longer needs the water (whichever comes first). Average annual deliveries to EBMUD are approximately 23,000 acre-feet. The maximum delivery in any one water year is approximately 99,000 acre-feet.

Several agreements modify the location of CVP deliveries, while the total quantities delivered remain unchanged. In normal and wet years, Delta inflow would be reduced by 3,200 acre-feet, or an average reduction of 4 cfs. During normal and wet years, Sacramento River flow nearly always exceeds 14,000 cfs, and the anticipated average change would be less than 0.03 percent. Delta diversions would be reduced by an identical amount, offsetting the minor change in flow. In the first year of a drought, inflow to the Delta would be increased by a nearly identical amount, and this increase would be offset by an identical increase in Delta pumping, resulting in no substantial change. In the second year of a drought, Delta inflow may be decreased by as much as 13 cfs on the average. This decrease (0.1 percent) remains minor compared to the typical flows of 10,000 cfs in the Sacramento River and is offset by decreased pumping in the Delta.

SAN JOAQUIN RIVER AGREEMENT/VERNALIS ADAPTIVE MANAGEMENT PLAN

Adopted by the State Board in D-1641, the San Joaquin River Agreement includes a 12-year experimental program providing for flows and exports in the lower San Joaquin River during a 31-day pulse flow period during April and May. It also provides for the collection of experimental data during that time to further the understanding of the effects of flows, exports, and the barrier at the Head of Old River (HORB) on salmon survival. This experimental program is commonly referred to as the VAMP.

To assist the outmigration of juvenile salmon from the San Joaquin River's eastside tributaries from mid-April through mid-May, the operators of the water projects located on the eastside tributaries manage reservoir releases to provide target flows in the San Joaquin River at Vernalis. At the same time, the HORB is closed so that the San Joaquin River flow at Vernalis primarily passes through the Sacramento River Deep Water Ship Channel rather than into the South Delta. The HORB culverts allow sufficient San Joaquin River water to pass into the South Delta to protect South Delta channel water levels.

The parties to the San Joaquin River Agreement include several agencies that contribute flow to the San Joaquin River, divert from or store water on the tributaries to the San Joaquin River, or have an element of control over the flows on the lower San Joaquin

River. These include Reclamation, the San Joaquin River Exchange Contractors, and the Oakdale, South San Joaquin, Modesto, Turlock, and Merced Irrigation Districts. The VAMP is based on coordination among these participating agencies in carrying out their operations to meet a steady target flow objective at Vernalis.

The target flow at Vernalis for the spring pulse flow period is determined each year according to the specifications contained in the San Joaquin River Agreement. The target flow is determined prior to the spring pulse flows as an increase above the existing flows and so "adapts" to the previous hydrologic conditions. Possible target flows specified in the agreement are 2,000 cfs, 3,200 cfs, 4,450 cfs, 5,700 cfs, and 7,000 cfs.

The Hydrology Group develops forecasts of flow at Vernalis, determines the appropriate target flow, devises an operations plan including flow schedules for each contributing agency, coordinates implementation of the VAMP flows, monitors conditions that may affect the objective of meeting the target flow, updates and adjusts the planned flow contributions as needed, and accounts for the flow contributions. The Hydrology Group includes designees with technical expertise from each agency that contributes water to the VAMP. During VAMP, the Hydrology Group communicates through regular conference calls and shares current information and forecasts by e-mail and an Internet website.

The VAMP program has two distinct components, a flow objective and an export restriction. The flow objectives were designed to provide similar protection to those defined in the 1995 Bay-Delta Plan. Fishery releases on the Stanislaus River above those called for in the 1987 CDFG Agreement are typically considered Section 3406(b)(2) releases. The export reduction involves a combined state and federal pumping limitation on the Delta pumps. The combined export targets for the 31 days of VAMP are specified in the San Joaquin River Agreement: 1,500 cfs (when target flows are 2,000 cfs, 3,200 cfs, 4,450 cfs, or 7,000 cfs), and 2,250 cfs (when target flow is 5,700 cfs, or 3,000 cfs [alternate export target when flow target is 7,000 cfs]).

During the 2003 VAMP, the state and federal projects averaged 1,446 cfs, substantially below the normal combined export pumping by the state and federal projects of from 10,000 to 14,000 cfs. The greatly reduced export pumping during VAMP operations is designed to reduce the influence of the state and federal export projects on the resources of the South Delta.

THE TRACY FISH FACILITY IMPROVEMENT PROGRAM

The Tracy Fish Collection Facility (TFCF) was developed and built by Reclamation with interagency cooperation in the 1950s as part of the CVP. Its purpose is to protect fish entering the Delta-Mendota Canal by way of the Tracy Pumping Plant. The Tracy Fish

Facility Improvement Program began in 1989 with the overall goal of improving fish protection and fish salvage at the TFCF and is a cooperative effort between Reclamation's Mid-Pacific Region and the Denver Technical Service Center, enhanced through cooperation, review and assistance from other agencies including the CDFG, DWR, the Service, and NOAA Fisheries. Universities, private consultants, and the San Luis and Delta-Mendota Water Authority also assist.

The TFCF uses behavioral barriers consisting of primary and secondary louvers to guide targeted fish into holding tanks before transport by hauling truck to release sites within the Delta. The CVP uses two release sites, one on the Sacramento River near Horseshoe Band and the other on the San Joaquin River immediately upstream of the Antioch bridge.

When compatible with export operations and technically feasible, facility louvers are operated with the objective of achieving water approach velocities for striped bass and for salmon. Channel velocity criteria are a function of bypass ratios through the facility. Further improvements that are being considered for the TFCF will not threaten current contracted water deliveries through the Tracy Pumping Plant.

SOUTH DELTA IMPROVEMENTS PROGRAM

DWR and Reclamation are responsible for implementing CALFED's South Delta Improvements Project (DWR 2004). Actions contemplated as part of the program include providing for more reliable long-term export capability by the state and federal water projects, protecting local diversions, and reducing impacts on San Joaquin River salmon. Specifically, the CALFED actions in the South Delta Improvements Program include consideration of the following elements:

- Increase SWP pumping from March 15 to December 15 from the current limit to 8,500 cfs and modify the pumping criteria from December 15 to March 15 to allow greater use of SWP export capacity.

- Increase SWP pumping to the maximum capability of 10,300 cfs.

- Design and construct new fish screens at the Clifton Court Forebay and Tracy Pumping Plant facilities to allow the export facilities to pump at full capacity more regularly.

- Dredge and install operable barriers to ensure water of adequate quantity and quality to agricultural diverters within the South Delta (the fish barrier proposed for the Head of Old River is contained in this element).

DWR has postponed the construction of new fish screen facilities because of uncertainties associated with the design of and funding for the fish screens and the lack of results from fish screen testing facilities at the Tracy Pumping Plant. Without the new fish screen facilities, no new intake into Clifton Court Forebay was proposed. DWR has, therefore, delayed the implementation of increasing SWP diversions to 10,300 cfs.

Reclamation and DWR expect that developing environmental documentation, obtaining permits, and constructing the permanent operable barriers will take until late 2007. In the interim, there may be strategic opportunities during high flow months to increase allowable pumping capability at the SWP Banks Pumping Plant beyond the current operating rules.

In accordance with the CALFED Record of Decision (CALFED 2000), implementation of increased permitted pumping is conditioned upon avoiding adverse impacts to fishery protection and in-Delta water supply reliability. In addition to the CALFED Record of Decision commitments, Reclamation and DWR agree that implementation of increased permitted pumping at the Banks pumping plant is also conditioned on:

- Reclamation and DWR constructing and operating permanent operable barriers in the South Delta to improve water quality and water level conditions and to provide fishery protection.

- Reclamation and DWR, in cooperation with other CALFED agencies and local interests, developing and implementing a comprehensive San Joaquin River Salinity Management Plan to enable reliable compliance with all current Delta water quality salinity objectives (electrical conductivity and chloride) for which the state and federal water projects have responsibility, in accordance with D-1641.

- Construction of the Beale and Byron Tracts aspects of the Old River and Rock Slough water quality improvement projects to protect and improve water quality conditions near the Contra Costa Canal.

- The Service, NOAA Fisheries, and CDFG developing and implementing environmental protection measures (including project-specific and updated programmatic federal biological opinions and state Natural Community Conservation Planning authorization to comply with federal Endangered Species Act and state Natural Community Conservation Planning requirements) that continue to protect and recover covered species to an equivalent level of protection as provided for in the CALFED Record of Decision. The assets needed to provide this level of protection will be adjusted periodically based on new science and other information.

- Reclamation, DWR, the Service, NOAA Fisheries, and CDFG developing and implementing a long-term EWA with appropriate water user and public funding to protect, recover, and restore at-risk native fish species that rely on the Delta, while providing water supply reliability commitments to the SWP and CVP exporters.

DELTA-MENDOTA CANAL/CALIFORNIA AQUEDUCT INTERTIE

As described in the CALFED Record of Decision (CALFED 2000), the goal of the Delta-Mendota Canal/California Aqueduct Intertie (Intertie) is to provide operational flexibility and improve water supply reliability of the CVP and the SWP. The project involves construction and operation of a pumping plant and pipeline between the Delta-Mendota Canal and the California Aqueduct at milepost 7.2 on the Delta-Mendota Canal, where the two projects are 500 feet apart. The project is designed to enable the CVP to use the full capacity of the Tracy Pumping Plant (presently operated to a maximum of 4,600 cfs). The agencies involved will develop cooperative operation of the Intertie.

The Intertie would be used to achieve multiple benefits, including meeting current water supply demands, allowing the CVP Delta export and conveyance facilities to be maintained and repaired, and providing operational flexibility to respond to emergencies. The Intertie would allow flow in both directions, which would provide additional flexibility to both CVP and SWP operations. The Intertie includes a 400 cfs pumping plant at the Delta-Mendota Canal that would allow water to be pumped from the Delta-Mendota Canal to the California Aqueduct. A flow of up to 950 cfs could be conveyed by gravity from the California Aqueduct to the Delta-Mendota Canal.

The Intertie will be owned by Reclamation but operated by the San Luis and Delta-Mendota Water Authority. A three-way agreement among Reclamation, DWR, and the San Luis and Delta-Mendota Water Authority would identify the responsibilities and procedures for operating the Intertie. Reclamation would obtain a permanent easement where the Intertie alignment crossed state property.

The Intertie provides operational flexibility between the Delta-Mendota Canal and California Aqueduct. It would not result in any changes to authorized pumping capacity at the Tracy or Banks Pumping Plant. The Intertie would be used under three different scenarios:

- Up to 400 cfs would be pumped from the Delta-Mendota Canal to the California Aqueduct to help meet water supply demands of CVP contractors. This would allow Tracy Pumping Plant to pump to its authorized capacity of 4,600 cfs, subject to all applicable export pumping restrictions for water quality and fishery protections.

- Up to 400 cfs would be pumped from the Delta-Mendota Canal to the California Aqueduct to minimize impacts to water deliveries because of emergency shutdowns or to reductions in water levels required by system maintenance on the lower Delta-Mendota Canal (south of the Intertie) or the upper California Aqueduct (north of the Intertie) for system maintenance or due to an emergency shutdown.

- Up to 950 cfs would be conveyed by gravity from the California Aqueduct to the Delta-Mendota Canal to minimize impacts to water deliveries because of emergency shutdowns or to reductions in water levels required by system maintenance on the lower California Aqueduct (south of the Intertie) or the upper Delta-Mendota Canal (north of the Intertie).

Water conveyed at the Intertie under these three scenarios could include pumping of CVP water at Banks Pumping Plant or SWP water at Tracy Pumping Plant through use of a JPOD.

To help meet water supply demands of the CVP contractors, operation of the Intertie would allow the Tracy Pumping Plant to pump to its full capacity of 4,600 cfs, subject to all applicable export pumping restrictions for water quality and fishery protections. When in use, water within the Delta-Mendota Canal would be transferred to the California Aqueduct via the Intertie. Water diverted through the Intertie would be conveyed through the California Aqueduct to O'Neill Forebay.

CONFORMED PLACE OF USE

On July 29, 1986, the State Board gave notice of a petition to change 16 of Reclamation's water right permits. The petition sought to:

- Conform the purposes of use in the permits.

- Consolidate the authorized places of use in the permits so that water from each of the CVP facilities may be delivered consistent with current integrated operations.

- Increase the authorized place of use depicted in the individual permits by including encroachment lands and expansion lands. Encroachment lands are lands within the CVP contractor service areas that have already received CVP water but are located outside the authorized CVP Place of Use. Expansion lands are lands within the CVP contractor service areas that have never received CVP water but are entitled to service pursuant to current water service contracts with Reclamation.

The Final Conformed Place of Use EIR was released to the public on November 15, 1999, and does not identify any new significant impacts. The modeling for the PEIS assumed that the process will be completed by 2025 and will include lands currently receiving CVP water.

WATER TRANSFERS

California water law and the CVPIA promote water transfers as important water resource management measures to address water shortages, provided certain protections to source areas and users are incorporated into the water transfer. Water transferees generally acquire water from sellers who have surplus reservoir storage water, sellers who can pump groundwater instead of using surface water, or sellers who will idle crops or substitute a crop that uses less water in order to reduce normal consumptive use of surface diversions.

Water transfers that are relevant to this analysis occur when a water right holder within the Delta or Sacramento-San Joaquin watershed undertakes actions to make water available for transfer by export from the Delta. Transfers requiring export from the Delta are done at times when pumping and conveyance capacities at the CVP or SWP export facilities are available to move the water. Additionally, operations to accomplish these transfers must be carried out in coordination with CVP and SWP operations, such that project purposes and objectives are not diminished or limited in any way.

In particular, parties to the transfer are responsible for providing for any incremental changes in flows required to protect Delta water quality standards. Reclamation and DWR will work to facilitate transfers and will complete them in accordance with all current regulations and requirements. This decision does not address the upstream operations that may be required to produce water for transfer.

The CVP and SWP may provide Delta export pumping for transfers, using available surplus capacity, up to the physical maximums of the pumps, consistent with prevailing operations constraints such as the export/import ratio, conveyance or storage capacity, and the protective criteria that may apply as conditions on such transfers. For example, pumping for transfers may have conditions for protection of Delta water levels, water quality, or fish.

The surplus capacity available for transfers will vary a great deal with hydrologic conditions. In general, as hydrologic conditions become wetter, surplus capacity diminishes because the CVP and SWP are more fully using export-pumping capacity for project supplies. The CVP has little surplus capacity, except in the drier hydrologic conditions. The SWP has the most surplus capacity in critical and some dry years, less or sometimes none in a broad middle range of hydrologic conditions, and some surplus again

in above normal and wet years, when demands may be lower because contractors have alternative supplies.

The availability of water for transfer and the demand for transfer water may also vary with hydrologic conditions. Accordingly, since many transfers are negotiated between willing buyers and sellers under prevailing market conditions, the price of water may also be a factor that determines how much water is transferred in any year. This document does not attempt to identify how much of the available and usable surplus export capacity of the CVP and the SWP will actually be used for transfers in a particular year, but recent history, the expectations for the EWA, and the needs of other transfer programs suggest a growing reliance on transfers.

The majority of transfers would likely occur during July through September and would increase Delta exports from 200,000 to 600,000 acre-feet in most years, after the 8,500 cfs capacity at Banks Pumping Plant is operational. Such future transfers would occur within the 8,500 cfs capacity at Banks Pumping Plant, and the 4,600 cfs capacity at Tracy Pumping Plant described in this document, and in no case would transfers require higher rates of pumping than those. The range of 200,000 to 600,000 acre-feet describes the surplus export capacity estimated to be available in July through September (primarily at Banks Pumping Plant) in about 80 percent of years when the 8,500 cfs capacity at Banks Pumping Plant is in place.

Under these conditions, transfer capability will often be capacity-limited. In the other 20 percent of years (which are critical and some dry years), both Banks and Tracy Pumping Plants have more surplus capacity, so capacity most likely is not limited to transfers. Rather, either supply or demand for transfers may be a limiting factor. In some dry and critical years, water transfers may range as high as 800,000 to 1,000,000 acre-feet depending on the severity of the water supply situation, cross-Delta capacity, and available supplies upstream.

During dry or critical years, low project exports and high demand for water supply could make it possible to transfer larger amounts of water. Low project exports in other months may also make it advantageous to expand the “normal transfer” season. Transfers outside the typical July through September season may be implemented when transferors provide water on a “fish-friendly” pattern. Real-time operations would be implemented as needed to avoid increased incidental take of listed species.

Reclamation and DWR coordinate the implementation of transfers through the CVPIA Section 3406(b)(2) Implementation Team, the Environmental Water Act Team, and the Water Operations Management Team to ensure that the required changes in upstream

flows and Delta exports do not disrupt planned fish protection actions. Reclamation and DWR will continue to use these groups for routine coordination of operations and transfers during the July through September season. Reclamation and DWR will also use these groups to help evaluate proposed transfers that would expand the transfer season or involve transfers in amounts significantly greater than the typical range anticipated by this project description, i.e., 200,000 to 600,000 acre-feet per year.

Although supply, demand, and price of water may at times be limiting factors, it would not be unreasonable to assume that in many years, all the available CVP and SWP capacity to facilitate transfers will be used.

NORTH-OF-DELTA OFFSTREAM STORAGE PROJECT

DWR, Reclamation, and their local partners are studying a proposal to develop offstream storage north of the Delta. The investigation includes Sites Reservoir and alternatives. Sites Reservoir would be located about 70 miles northwest of Sacramento in Antelope Valley and would store up to 1.8 million acre-feet of water.

The objective for the North-of-the-Delta Offstream Storage project specified in the CALFED Record of Decision (CALFED 2000) is to enhance water management flexibility in the Sacramento Valley. By reducing water diversions from the Sacramento River during critical fish migration periods, this project can greatly increase the reliability of supplies for a significant portion of the Sacramento Valley. It can also provide storage and operational benefits for other CALFED programs including Delta water quality and the EWA.

Potential benefits of the North-of-the-Delta Offstream Storage project include the following:

- Improve water supply reliability for local agricultural service contractors.
- Improve water supply reliability for Sacramento Valley refuges.
- Provide water for rice decomposition in Sacramento Valley.
- Improve water supply reliability for CVP and SWP contractors south of the Delta.
- Improve Delta water quality.
- Reduce diversions from the Sacramento River during critical fish migration periods.

- Provide water and storage for CALFED's EWA.

- Provide water for CALFED's Ecosystem Restoration Program objectives.

The Glenn-Colusa Irrigation District, Tehama-Colusa Canal Authority, CDFG, the Service, DWR, and Reclamation are working with other local water agencies and other state and federal agencies on this project.

A draft feasibility study and draft environmental documentation for the North of the Delta Offstream Storage project are scheduled for completion in 2006.

GRASSLANDS BYPASS PROJECT

Historically, farmers in the Grasslands area of the western San Joaquin Valley have discharged subsurface agricultural drain water through wetland channels in the San Luis National Wildlife Refuge complex to the San Joaquin River. This drainage contains elevated concentrations of selenium, salt, boron, and other trace elements.

Bypassing 90 miles of wetland channels, a portion of the San Luis Drain was reopened in September 1996 as the Grasslands Bypass Project (GBP). The San Luis Drain has been modified to allow discharge through six miles of Mud Slough, a natural waterway that traverses the San Luis National Wildlife Refuge Complex and a section of the North Grassland Wildlife Area.

Administered by the San Luis and Delta-Mendota Water Authority, the GBP serves approximately 97,000 acres in the Grassland Drainage Area (GDA). The GBP serves approximately 16,500 acres within DMC Unit contractors, including Broadview Water District, Eagle Field Water District, Oro Loma Water District, Mercy Springs Water District, and Widren Water District, as well as 28,000 acres in portions of Firebaugh Canal Water District and Central California Irrigation District, and 5,500 acres that are outside any organized district. The balance of the area served is in the San Luis Unit.

Since October 1996, subsurface agricultural drainage water produced in the 97,000-acre GDA has been collected and routed into the San Luis Drain pursuant to the Use Agreement Between the United States and the San Luis and Delta-Mendota Water Authority. From the San Luis Drain, the subsurface drainage water is discharged into Mud Slough (north), a tributary of the San Joaquin River upstream of the Merced River.

Under the terms of the use agreement as well as under waste discharge requirements issued by the Regional Water Quality Control Board (Regional Board), a substantial reduction in drainage discharges is required in order to meet load targets for selenium and salinity.

Phase I of the GBP occurred between October 1996 and September 2001. Phase II began in October 2001 and will continue through December 31, 2009. Reclamation and the San Luis and Delta-Mendota Water Authority prepared an environmental impact statement/ environmental impact report that examined the environmental effects of the Phase II use agreement. The waste discharge requirement from the Regional Board were adopted on September 7, 2001 (Order No. 5-01-234). A Biological Opinion was issued for Phase II of the GBP on September 28, 2001 (Service 2001e).

In addition to concentration-based standards, monthly and annual selenium load allocations (pounds of selenium) for the GDA have been adopted and incorporated into the WDR and the GBP use agreement.

Farmers in the GDA formed a regional drainage entity, employed a drainage coordinator, adopted tiered water pricing, adopted a rule for internal selenium load allocation and trades, implemented efforts to improve irrigation efficiency, developed infrastructure to recycle subsurface drainage, and conducted extensive internal monitoring to control and track selenium load discharged from the GDA. The GBP Monitoring Program conducts extensive water quality monitoring of affected receiving waters and is a joint effort of Reclamation, the San Luis and Delta-Mendota Water Authority, the Service, USEPA, U.S. Geological Survey, the Regional Board, and CDFG. Monitoring data are reviewed monthly by the Data Collection and Reporting Team and published by the San Francisco Estuary Institute (Reclamation 2000d). A biological monitoring program is conducted in accordance with a more comprehensive program developed by Reclamation, the Service, U.S. Geological Survey, CDFG, and the Regional Board in conjunction with the project participants.

The waste discharge requirements for the GBP also require a long-term drainage management plan, which has been submitted to the Regional Board and is periodically updated. Furthermore, the GBP EIS included an assessment of the initial phase of an in-valley drainage management project, the San Joaquin River Improvement Project. This project is being developed by Panoche Drainage District for the collection and application of subsurface drainage to salt-tolerant crops and is made available to contractors participating in the GBP to achieve load reduction targets. Subsequent phases of the project will provide a long-term in-valley drainage plan for the land currently participating in the GBP, to be available upon termination of the GBP. Additional environmental reviews will be conducted for future phases of the long-term drainage management actions.

OTHER RELATED ACTIVITIES AFFECTING SOUTH-OF-DELTA WATER SUPPLY RELIABILITY

In addition to these related activities, several other projects will have some effect on south-of-Delta deliveries, including, but not limited to, additional Endangered Species Act listings, Mendota Pool transfer pumping operations, conditional waivers of waste discharge requirements for discharges from irrigated lands, and other projects that place additional demands on water originating north of the Delta, the Delta, or those sources of supply that were historically relied upon for south-of-Delta deliveries.

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

Chapter 2
Description of Alternatives

February 2005

CHAPTER 2

DESCRIPTION OF ALTERNATIVES

This chapter summarizes the long-term water service contract negotiations process and describes the alternatives considered in this EA.

LONG-TERM WATER SERVICE CONTRACT NEGOTIATION PROCESS

The CVPIA states that the Secretary shall, upon request, renew any long-term irrigation repayment or water service contract for the delivery of CVP water for a 25-year period and may renew such contracts for successive periods of up to 25 years each. Consistent with the Act of June 21, 1963 Act, M&I contracts shall be renewed for successive periods up to 40 years, each under mutually agreeable terms and conditions. The CVPIA also states that no renewals shall be authorized until appropriate environmental review, including the CVPIA PEIS, has been completed. The CVPIA PEIS provided a programmatic environmental analysis and identified the need for site-specific environmental documents for the long-term contract renewal process.

The CVPIA also states that contracts expiring before the CVPIA PEIS has been completed may be renewed for interim periods. The interim renewal contracts reflect current Reclamation law, including modifications resulting from the Reclamation Reform Act and applicable CVPIA requirements. The initial interim contract renewals were negotiated in 1994 with subsequent renewals for periods of two years or less to provide continued water service. Many of the provisions from the interim contracts were assumed to be part of the contract renewal provisions in the description of the PEIS Preferred Alternative.

In 1998, the long-term water service contract renewal process was initiated. Reclamation reviewed the interim contract provisions that were consistent with Reclamation law and other requirements, comments from the Draft CVPIA PEIS, and comments obtained during the interim contract renewal process. Reclamation proposed that the overall provisions of the long-term contract would be negotiated with representatives of all CVP water service contractors. Following the acceptance of the CVP-wide provisions, Reclamation proposed that division-specific provisions and, finally, contractor-specific provisions would be negotiated.

Correspondingly, division-specific and contractor-specific contract provisions are being negotiated as part of the renewal of long-term water service contracts for the DMC Unit. Negotiations between Reclamation and the DMC Unit contractors have been completed. Table 2-1 provides a summary and comparison of the contract provisions for the DMC Unit contractors that is current as of the time of the writing of this EA.

TERMS OF EXPIRING CONTRACTS

All of the DMC Unit contractors have water service and repayment contracts with Reclamation. The long-term contracts were entered into between the early 1950s and the late 1960s. Temporary project service had often been provided before the first long-term water service contracts were signed. The first group of long-term water service contracts in the DMC Unit expired February 28, 1994, with the other contracts remaining in effect until December 31, 2003, with the exception of the contract for the City of Tracy, which will expire in 2008. Expired long-term contracts in the DMC Unit have been extended through a series of interim renewal contracts. Information on the quantity and use of the CVP supply is included in Table 2-2.

ISSUES CONSIDERED AS PART OF LONG-TERM CONTRACT RENEWALS

The long-term water service contract renewal process addresses several other issues in addition to the contract provisions as described in this section.

WATER NEEDS ASSESSMENTS

The water rights granted to the CVP by the State Board require the federal government to determine whether CVP water is being applied to beneficial use. The Reclamation Act of 1902 states that beneficial use is the measure of an entity's right ot water; thus state law is not the only law requiring that water be beneficially used. To this end, a needs assessment methodology was developed, specifically for the long-term contract renewal analysis, to determine if the contractors could use their full contract amount reasonably and beneficially. This assessment was computed for certain contractors within the DMC Unit using a multiple-step approach. First, the existing water demand for the contractor was calculated, based on historic water uses. Crop acreages, cropping patterns, crop water needs, effective precipitation, and conveyance loss information provided by each contractor were reviewed for agricultural water use. Residential, commercial, industrial, institutional, recreational, and environmental uses, along with landscape coefficients, system losses, and landscape acreage information provided by each contractor, were reviewed for M&I water use. Second, future changes in water demands based upon crops,

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
Explanatory Recitals	Assumes water rights held by CVP from the State Board for use by water service contractors under CVP policies	Assumes CVP Water Right as being held in trust for project beneficiaries that may become the owners of the perpetual right	Same as No-Action Alternative	Same as No-Action Alternative
	Assumes that CVP is a significant part of the urban and agricultural water supply of users	Assumes CVP as a significant, essential, and irreplaceable part of the urban and agricultural water supply of users	Same as No-Action Alternative	Assumes CVP has been relied upon and considered essential by contractors
	Assumes increased use of water rights, need to meet water quality standards and fish protection measures, and other measures constrained use of CVP	Assumes that CVPIA impaired ability of CVP to deliver water	Same as No-Action Alternative	No recital concerning this issue
	Assumes the need for the 3408(j) study	Assumes implementation of yield increase projects per 3408(j) study	Same as No-Action Alternative	Assumes Secretary, through coordination, cooperation, and partnership, will pursue measures to improve water supply
	Assumes that loss of water supply reliability would have impact on socioeconomic conditions and change land use	Assumes that loss of water supply reliability would have significant adverse socioeconomic and environmental impacts in CVP service area	Same as No-Action Alternative	Same as No-Action Alternative
Definitions				
Base Supply	Not previously defined	Not previously defined	Not previously defined	Quantity of Project Water designated in contracts as the amount determined from historic deliveries and is considered relatively reliable in normal or wet years
Charges	Charges defined as payments required in addition to Rates	Assumes rewording of definition of Charges to exclude both Rates and Tiered Pricing Increments	Same as No-Action Alternative	Same as Alternative 1

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
Category 1 and Category 2	Tiered Pricing as in PEIS	Not included	Tiered Pricing for Categories 1 and 2	Same as Alternative 1
Contract Total	Contract Total described as Total Contract	Same as No-Action Alternative	Described as basis for Category 1 to calculate Tiered Pricing	Same as No-Action Alternative
Landholder	Landholder described in existing Reclamation Law	Assumes rewording to specifically define Landholder with respect to ownership, leases, and operations	Assumes rewording to specifically define Landholder with respect to ownership and leases	Same as No-Action Alternative
Supplemental Supply	Not previously defined	Not previously defined	Not previously defined	Quantity of Project Water that is in addition to and less reliable than the Base Supply
M&I water	Assumes rewording to provide water for irrigation of land in units less than or equal to five acres as M&I water unless Contracting Officer is satisfied use is irrigation	M&I water described for irrigation of land in units less than or equal to 2 acres	Same as No-Action Alternative	Same as No-Action Alternative
Terms of contract—right to use contract	Assumes that contracts may be renewed	States that contract shall be renewed	Same as No-Action Alternative	Assumes contracts will be renewed, subject to conditions for agriculture and unconditioned for M&I
	Assumes convertibility of contract to a 9(d) contract same as existing contracts	Includes conditions that are related to negotiations of the terms and costs associated with conversion to a 9(d) contract	Same as No-Action Alternative	Sets December 31, 2024, as date on which determination on conversion may be made upon mutually agreeable terms
Water to be made available and delivered to the contractor	Assumes water availability in accordance with existing conditions	Similar to No-Action Alternative	Actual water availability in a year is unaffected by Categories 1 and 2	Similar to No-Action Alternative
	Assumes compliance with Biological Opinions and other environmental documents for contracting	Not included	Same as No-Action Alternative	Similar to No-Action Alternative. Requires contractor to be within legal authority to implement

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes that CVP operations will be conducted in a manner to minimize shortages and studies to increase yield shall be completed with necessary authorizations	Same as No-Action Alternative	Same as No-Action Alternative
Time for delivery of water	Assumes methods for determining timing of deliveries as in existing contracts	Assumes minor changes related to timing of submittal of schedule	Same as No-Action Alternative	Same as No-Action Alternative
Point of diversion and responsibility for distribution of water	Assumes methods for determining point of diversion as in existing contracts	Assumes minor changes related to reporting	Same as No-Action Alternative	Same as No-Action Alternative
Measurement of water within district	Assumes measurement for each turnout or connection for facilities that are used to deliver CVP water as well as other water supplies	Assumes measurement at delivery points	Assumes similar actions in No-Action Alternative but applies to all water supplies	Same as Alternative 2
Rates and method of payment for water	Assumes Tiered Pricing is total water quantity; assumes advanced payment for rates for two months	Assumes Tiered Pricing is total water quantity; assumes advanced payment for rates for one month	Assumes Tiered Pricing is total water quantity; assumes advanced payment for rates for six months	Same as No-Action Alternative CVP-wide.
Non-interest-bearing operation and maintenance deficits	Assumes language from existing contracts	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Sales, transfers, or exchanges of water	Assumes continuation of transfers with the rate for transferred water being the higher of the seller's or purchaser's CVP cost-of-service rate	Assumes continuation of transfers with the rate for transferred water being the purchaser's CVP cost-of-service rate	Same as No-Action Alternative	Assumes continuation of transfers with rate for transferred water being transferor's rate adjusted for additional or reduced costs related to transfer and adjusted to remove any ability to pay relief
Application of payments and adjustments	Assumes payments will be applied as in existing contracts	Assumes minor changes associated with methods described for overpayment	Same as No-Action Alternative	Similar to Alternative 1, but requires $1,000 or greater overpayment for refund

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
Temporary reduction—return flows	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes minor changes associated with methods described for discontinuance or reduction of payment obligations	Same as No-Action Alternative	Same as No-Action Alternative
Constraints on availability of project water	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes Contractors do not consent to future Congressional enactments which may impact water supply reliability	Same as No-Action Alternative	Same as No-Action Alternative
Unavoidable groundwater percolation	Assumes that some of applied CVP water will percolate to groundwater	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Rules and regulations	Assumes that CVP will operate in accordance with then-existing rules	Assumes minor changes with right to not concur with future enactments retained by Contractors	Same as No-Action Alternative	Same as No-Action Alternative
Water and air pollution control	Assumes that CVP will operate in accordance with then-existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Quality of water	Assumes that CVP will operate in accordance with existing rules without obligation to operate toward water quality goals	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Water acquired by the contractor other than from the United States	Assumes that CVP will operate in accordance with existing rules	Assumes changes associated with payment following repayment of funds	Same as No-Action Alternative	Same as No-Action Alternative
Opinions and determinations	PEIS recognizes that CVP will operate in accordance with existing rules	Assumes minor changes with respect to references to the right to seek relief	Same as No-Action Alternative	Similar to Alternative 1
Coordination and cooperation	Not included	Assumes that coordination and cooperation between CVP operations and users should be implemented and CVP users should participate in CVP operational decisions	Not included	Similar to Alternative 1, except parties retain exclusive decision-making authority

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
Charges for delinquent payments	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Equal opportunity	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
General obligation	Assumes that CVP will operate in accordance with existing rules	Similar to No-Action Alternative	Same as No-Action Alternative	Similar to Alternative 1; assumes no requirement for contractor to levy in advance
Compliance with civil rights laws and regulations	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Privacy act compliance	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Contractor to pay certain miscellaneous costs	Assumes that CVP will operate in accordance with existing rules	Similar to No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Water conservation	Assumes compliance with conservation programs established by Reclamation and the State of California	Assumes conditions similar to No-Action Alternative with the ability to use State of California standards, which may or may not be identical to Reclamation's requirements	Same as No-Action Alternative	Same as No-Action Alternative
Existing or acquired water or water rights	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Operation and maintenance by non-federal entity	Assumes that CVP will operate in accordance with existing rules and no additional changes to operation responsibilities under this alternative	Assumes minor changes to language that would allow subsequent modification of operational responsibilities	Assumes minor changes to language that would allow subsequent modification of operational responsibilities	Same as Alternative 2
Contingent on appropriation or allotment of funds	Assumes that CVP will operate in accordance with existing rules	Assumes minor changes to language	Same as No-Action Alternative	Same as No-Action Alternative

Table 2-1
Comparison of Contract Provisions Considered in Alternatives

Provision	No-Action Alternative Based on PEIS and Interim Contracts	Alternative 1 Based on April 2000 Proposal	Alternative 2 Based on November 1999 Proposal	Preferred Alternative
Books, records, and reports	Assumes that CVP will operate in accordance with existing rules	Assumes changes for record keeping for both CVP operations and CVP users	Same as No-Action Alternative	Similar to Alternative 1
Assignment limited	Assumes that CVP will operate in accordance with existing rules	Assumes changes to facilitate assignments	Same as No-Action Alternative	Similar to Alternative 1
Severability	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Resolution of disputes	Not included	Assumes a Dispute Resolution Process	Not included	Similar to Alternative 1
Officials not to benefit	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Changes in contractor's service area	Assumes no change in CVP water service areas absent Contracting Officer consent	Assumes changes to limit rationale used for non-consent and sets time limit for assumed consent.	Same as No-Action Alternative	Similar to Alternative 1; however, no time limit for assumed consent
Notices	Assumes that CVP will operate in accordance with existing rules	Same as No-Action Alternative	Same as No-Action Alternative	Same as No-Action Alternative
Confirmation of contract	Assumes Court confirmation of contract	Not included; assumption is Court confirmation not required	Same as No-Action Alternative	Similar to Alternative 2; however, provision that contract is not binding until court confirms is deleted

Table 2-2
CVP Water Service Contract Amounts and Service Areas for Contractors in the Delta-Mendota Canal Unit

Contractor	Water Service Contract Amount (acre-feet)	Primary Contract Use	Contract Term (years)
Banta-Carbona Irrigation District	20,000	Agriculture	25
Broadview Water District	27,000	Agriculture	25
Centinella Water District	2,500	Agriculture	25
City of Tracy	20,000	M&I	40
Coehlo Family Trust	2,080	Agriculture	25
Del Puerto Water District	140,210	Agriculture	25
Eagle Field Water District	4,550	Agriculture	25
Fresno Slough Water District	4,000	Agriculture	25
James Irrigation District	35,300	Agriculture	25
Laguna Water District	800	Agriculture	25
Tranquillity Public Utilities District	70	Agriculture	25
Mercy Springs Water District	7,040	Agriculture	25
Oro Loma Water District	4,600	Agriculture	25
Patterson Irrigation District	16,500	Agriculture	25
Plain View Water District	20,600	Agriculture	25
Reclamation District #1606	228	Agriculture	25
The West Side Irrigation District	2,500	Agriculture	25
Tranquillity Irrigation District	13,800	Agriculture	25
West Stanislaus Water District	50,000	Agriculture	25
Widren Water District	2,990	Agriculture	25

M&I expansion, and anticipated changes in efficiencies were reviewed. Third, current and future water supplies, including groundwater and other surface water supplies, were identified for each contractor. The initial calculation of CVP water needs was limited by the assumption that other (non-federal) water supplies would be used first, and groundwater pumping would not exceed the safe yield of the aquifer. Reclamation did not include any deep percolation from fields as recharge. In addition, the actual water needs were calculated at each division or unit level to allow for annual intraregional transfers.

The beneficial and efficient future water demands identified for each contractor were compared to available non-CVP water supplies to determine the need for CVP water. If the negative amount (unmet demand) is within 10 percent of their total supply for contracts greater than 15,000 acre-feet per year, or within 25 percent for contracts less than or equal to 15,000 acre-feet per year, the test of full future need of the water supplies under the settlement contract is deemed to have been met. Because the CVP was initially established as a supplemental water supply for areas with inadequate supplies, the needs for most contractors were at least equal to the CVP water service contract and frequently exceeded

the previous contract amount. Increased total contract amounts were not included in the needs assessment because the CVPIA stated that Reclamation could not increase contract supply quantities.

Water needs assessments were completed for those contractors who had more than 2,000 acres of irrigable land and whose contract total was greater than 2,000 acre-feet. Thirteen of the 20 DMC Unit contractors met these criteria (Reclamation 2004d). Water needs assessments were not completed for Centinella Water District, Eagle Field Water District, Fresno Slough Water District, Laguna Water District, Oro Loma Water District, Reclamation District #1606, and Widren Water District. Tables 2-3 and 2-4 show the total amounts of CVP water delivered to each contractor, based on the completed water needs assessments. Included in these tables are the contractor's total water supply (including any transfers or exchanges into or out of the contractor's service area), the total water demand, and the amount of the surplus or unmet demand. The water supply, demand, and delivery information in Tables 2-3 and 2-4 is based on a normal hydrologic year (Reclamation 2004d).

The likelihood of the contractors actually receiving the full contract amount in any given year is uncertain. The analysis for the water needs assessment did not consider that the CVP's ability to deliver CVP water has been constrained in recent years and may be constrained in future years due to many factors including hydrologic conditions and implementation of federal and state laws.

CHANGES IN WATER SERVICE AREAS

The existing long-term water service contract renewals require the Contracting Officer's consent to boundary changes. Contract renewal would, therefore, not alter the likelihood of boundary changes. This EA does not consider future changes in water service area boundaries for the use of CVP water because it is uncertain where or if such changes would occur and because future changes require discretionary actions. Thus, any future requests for changes in water service area boundaries for the use of CVP water would be evaluated in separate technical and environmental analyses. Thus, the potential for environmental effects from such future boundary changes would depend entirely on whether the transfers result in any changes from the existing environmental baseline, which can appropriately be evaluated only in the environmental review for those transfers.

Table 2-3
Contractors' Water Supply Sources and Quantities for 1989
(in acre-feet and based on a normal hydrologic year)

Contractor	Total Delivery	Surface Water Supply	Groundwater[1]	Transfers/ Exchanges In	Transfers/ Exchanges Out	Total Supply	Agricultural Demand	M&I Demand	Total Demand[2]	Unmet Demand[3]
Banta-Carbona Irrigation District	21,023	29,248[4]	0	0	7,150	43,121	50,385	0	50,385	7,264
Broadview Water District	32,975	0	0	0	8,104	24,871	26,741	0	26,741	1,870
City of Tracy[5]	0	0	5,000	0	0	5,000	0	12,487	12,487	7,487
Coehlo Family Trust[11]	2,080	1,336[6]	1,336	0	0	4,752	8,760	0	8,760	4,008
Del Puerto Water District	128,395	0	0	0	0	128,395	144,261	0	144,261	15,866
James Irrigation District[7]	38,407	9,700[8]		35,498	12,000	71,605	71,541	0	71,541	-64
Mercy Springs Water District[9]	13,850	0	0	550	4,084	10,316	10,064	0	10,064	-252
Patterson Irrigation District	20,428	25,483	535	4,000	7,400	43,046	47,062	0	47,062	4,016
Plain View Water District[10]	18,351	0	0	0	1,636	16,715	19,113	0	19,113	2,398
The West Side Irrigation District	7,500	19,823[4]	0	600	0	27,923	30,605	0	30,605	2,682
Tranquility Irrigation District	7,825	20,200	547	0	5,975	22,597	32,765	300	33,065	10,468
West Stanislaus Water District	50,000	51,610[4]	3,692	5,454	30,490	80,266	90,203	0	90,203	9,937

Source: Reclamation 2004d.

Note: Needs assessments were not completed for Centinella Water District, Eagle Field Water District, Fresno Slough Water District, Laguna Water District, Tranquillity Public Utilities District (formerly, the Mardella Hughes property), Oro Loma Water District, Reclamation District #1606, and Widren Water District. Data for these districts are unavailable, but Reclamation has confirmed both past beneficial use and continuing needs through 2026 of the current maximum annual CVP supply.

[1]The amount of groundwater recharge is subtracted from the groundwater pumped. Negative numbers represent scenarios where recharge is greater than the amount pumped.

[2]Agricultural demand plus M&I demand.

[3]Total demand less total supply.

[4]Local source is the amount of any settlement contract for district's claims to San Joaquin or Kings River water, and/or water diversions pursuant to state water rights.

[5]City of Tracy data are for 1995.

[6]State Water Project supply.

[7]James Irrigation District data are for 1996.

[8]Kings River riparian water.

[9]The contract supply was reduced in 2025 because of contract reassignments.

[10]Plain View Water District has entered into Memoranda of Understanding with the City of Tracy that Plain View Water District will make an agreed-upon quantity of water available for treatment and delivery to certain specified lands within the Plain View Water District's service area.

[11]Coehlo Family Trust data is for 1999.

Table 2-4
Contractors' Water Supply Sources and Quantities for 2025
(in acre-feet and based on a normal hydrologic year)

Contractor	Total Delivery[1]	Surface Water Supply	Groundwater[2]	Transfers/ Exchanges In	Transfers/ Exchanges Out	Total Supply	Agricultural Demand	M&I Demand	Total Demand[3]	Unmet Demand[4]
Banta-Carbona Irrigation District	25,000	30,000[5]	230	0	8,480	46,750	45,920	0	45,920	-830
Broadview Water District	27,000	0	0	0	1,900	25,100	25,100	0	25,100	0
City of Tracy	10,000	0	5,000	32,500	0	47,500	0	46,000	46,000	-1,500
Coehlo Family Trust	2,000	1,336[6]	3,334	0	0	6,670	6,637	0	6,637	-33
Del Puerto Water District	140,210	0	3,000	0	3,000	140,210	142,735	0	142,735	2,525
James Irrigation District[7]	35,300	9,700[7]	0	12,300	12,534	44,766	59,932	0	59,932	15,166
Mercy Springs Water District[8]	7,040	0	0	0	0	7,040	16,765	0	16,765	9,725
Patterson Irrigation District	16,500	23,000[5]	535	2,000	6,000	36,035	53,242	0	53,242	17,207
Plain View Water District[9]	20,600	0	0	0	12,900	7,700	7,995	0	7,995	295
The West Side Irrigation District[10]	7,500	22,046[5]	0	600	6,300	23,846	22,052	0	22,052	-1,794
Tranquility Irrigation District	13,800	20,200[5]	0	2,600	3,600	33,000	29,229	324	29,553	-3,447
West Stanislaus Water District	50,000	45,000[5]	3,692	5,000	18,993	84,699	84,699	0	84,699	0

Source: Reclamation 2004d.

Note: Needs assessments were not completed for Centinella Water District, Eagle Field Water District, Fresno Slough Water District, Laguna Water District, Tranquillity Public Utilities District (formerly, the Mardella Hughes property), Oro Loma Water District, Reclamation District #1606, and Widren Water District. Data for this table are not available for these districts, but Reclamation has confirmed both past beneficial use and continuing needs through 2026 of the current maximum annual CVP supply.

[1]Also represents the maximum CVP contract amount.

[2]The amount of groundwater recharge is subtracted from the groundwater pumped. Negative numbers represent scenarios where recharge is greater than the amount pumped.

[3]Agricultural demand plus M&I demand.

[4]Total demand less total supply.

[5]Local source is the amount of any settlement contract for district's claim to San Joaquin or Kings River water, and/or water diversion pursuant to state water rights.

[6]State Water Project supply.

[7]Kings River riparian water.

[8]The contract supply was reduced in 2025 because of contract reassignments.

[9]Plain View Water District has entered into Memoranda of Understanding with the City of Tracy that Plain View Water District will make an agreed-upon quantity of water available for treatment and delivery to certain specified lands within the Plain View Water District's service area.

[10]Transfers out for 2026 are based on historical average of 1,300 acre-feet plus an anticipated 5,000 acre-foot transfer to the City of Tracy.

WATER TRANSFERS

Water transfers are not included in the federal action. The long-term water service contract renewal would continue to permit transfers only with the Contracting Officer's consent. Reclamation would continue with separate environmental documentation for proposed transfers, establishing criteria and protocols to allow rapid technical and environmental review of future proposed transfers (for example, by providing programmatic environmental review and shortened authorization for one-year irrigation-to-irrigation transfers between contractors to adjust supplies when no additional land will be irrigated). Table 2-3 shows the water transfers and exchanges both into and out of the DMC Unit contractors' service areas for the year 1989. While it is difficult to identify all the water transfer programs that would occur over the next 25 years, Table 2-4 shows the estimated water transfers and exchanges for the DMC Unit contractors for the year 2025.

The federal action would not cause a change in frequency, size, or nature of transfers. Because any future transfers of CVP water to or from the DMC Unit contractors in response to changed short-term or long-term demands could not occur without the existence of the contract, any such transfers may be considered an indirect result of the CVP contract. However, whether such transfers will result in environmental effects would depend entirely on whether the transfers result in any changes from the existing environmental baseline, which can appropriately be evaluated only in the environmental review for those transfers.

DEVELOPMENT OF ALTERNATIVES

Three alternatives and the Preferred Alternative were identified for the renewal of long-term contracts between Reclamation and the 20 DMC Unit contractors. The alternatives present a range of water service agreement provisions that could be implemented for long-term water service contract renewals. The first alternative, the No-Action Alternative, consists of renewing existing water service contracts as described by the Preferred Alternative of the CVPIA PEIS (Reclamation and Service 1999). In November 1999, Reclamation published a proposed long-term water service contract. In April 2000, the CVP contractors presented an alternative long-term water service contract. The November 1999 proposal serves as the basis for one "bookend" for negotiations and the April 2000 proposal represents the basis for the other "bookend." The Preferred Alternative represents the results of the 2004 negotiations and also the proposed contract that fits between these two "bookends." This EA considers these proposals with the No-Action Alternative as "bookends" to be considered for the environmental documentation to evaluate the impacts and benefits of renewing long-term water service contracts. Reclamation and the CVP contractors have continued to negotiate the 2004 CVP-wide terms and conditions, with

these proposals serving as the basis for an analysis of such "bookends." The primary differences between the proposals and the final negotiated contract are summarized in Table 2-1. Table 2-5 compares the environmental consequences of long-term contract renewals under Alternative 1, Alternative 2, and the Preferred Alternative to those of the No-Action Alternative.

NO-ACTION ALTERNATIVE

The No-Action Alternative assumes that the long-term CVP water service contracts would be renewed for a 25-year period in accordance with implementation of the CVPIA as described in the CVPIA PEIS Preferred Alternative. The CVPIA PEIS Preferred Alternative assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP Interim Renewal Contracts, which included contract terms and conditions consistent with applicable CVPIA requirements. In addition, the No-Action Alternative assumed tiered pricing provisions and environmental commitments as described in the CVPIA PEIS Preferred Alternative. The provisions of the No-Action Alternative also are summarized in Table 2-1. These provisions were described in the Final CVPIA PEIS (Reclamation and Service 1999).

Several applicable CVPIA provisions are summarized below in the description of the No-Action Alternative because they are included in a different manner in Alternatives 1 and/or 2 and, therefore, could result in changes in environmental impacts or benefits. These issues include tiered water pricing, definition of M&I water users, water measurement, and water conservation.

TIERED WATER PRICING

The CVPIA required the implementation of a tiered water pricing component, which is the incremental amount to be paid for each acre-foot of water delivered. The tiered pricing component for the amount of water delivered up to 80 percent of the contract total shall not be less than the established rate/charges for the contractor. The tiered pricing component for the amount of water delivered in excess of 80 percent of the contract total, but less than or equal to 90 percent of the contract total, shall equal one-half of the difference between the rate/charges established for the contractor and the M&I full cost rate. The tiered pricing component for the amount of water that exceeds 90 percent of the contract total shall equal the difference between (1) the rate/charges determined annually by the Contracting Officer in accordance with the then-current applicable Reclamation water rate-setting policies and (2) the M&I full cost water rate.

Table 2-5
Environmental Consequences of Long-Term Contract Renewal Alternatives 1 and 2 as Compared to the No-Action Alternative

Affected Resource/Concern	Environmental Consequences of Alternative 1	Environmental Consequences of Alternative 2
Agriculture	Agricultural resource use assumed to be similar to the No-Action Alternative because the amount of water delivered, the timing of those deliveries, and the rates and methods of payment for deliveries do not substantially differ from the No-Action Alternative.	Impacts to Delta-Mendota Canal Unit total irrigated acreage range from a 1,600-acre decrease during a wet year to a 3,000-acre increase during a dry year. Impacts to Delta-Mendota Canal Unit value of production range from $1.0 million decrease during an average year following a dry, five-year period to a $1.2 million increase during a dry year. Impacts to Delta-Mendota Canal Unit net farm revenues range from a $700,000 decrease during a wet year following a wet five-year period to a $2.2 million increase during a dry year following a dry five-year period.
Socioeconomics/ Power Resources	Socioeconomic and power resources impacts are expected to be similar to the No-Action Alternative because the amount of water delivered, the timing of those deliveries, and the rates and methods of payment for deliveries do not substantially differ from the No-Action Alternative.	No impacts to power resources because CVP hydroelectric facilities would continue to be operated as under No-Action Alternative conditions. San Joaquin River region total employment would decrease by 120 jobs and income from profits and wages would decrease by $4.2 million under the Average-Average hydrologic sequence. Region would lose an estimated 250 persons. San Joaquin River region total employment would decrease by 420 jobs and income from profits and wages would decrease by $12.4 million under the Dry-Average hydrologic sequence. Region would lose an estimated 873 persons.
Land Use	No direct adverse impacts to land use. Renewed contract water deliveries continue to accommodate a portion of planned growth and support agricultural land uses as under No-Action Alternative conditions.	No direct adverse impacts to land use. Renewed contract water deliveries would continue to accommodate a portion of planned growth and support agricultural land uses as under No-Action Alternative conditions.
Air Quality	Similar crops, cropping patterns, and total irrigated acreage would not result in substantial fallowed acreage capable of adverse fugitive dust or related air quality impacts when compared to the No-Action Alternative.	Similar crops, cropping patterns, and total irrigated acreage would not result in substantial fallowed acreage capable of adverse fugitive dust or related air quality impacts when compared to the No-Action Alternative.

Table 2-5
Environmental Consequences of Long-Term Contract Renewal Alternatives 1 and 2 as Compared to the No-Action Alternative

Affected Resource/Concern	Environmental Consequences of Alternative 1	Environmental Consequences of Alternative 2
Soils and Geology	Same as No-Action Alternative	Increased groundwater pumping could increase land subsidence. Increased soil salinity could result from reductions in surface water purchased and, therefore, available for leaching salts through crop root zones or from poor quality groundwater pumped in response to reduced deliveries.
Groundwater	Same as No-Action Alternative	Increased pumping in response to reduced purchases of surface water deliveries in response to higher tiered prices could reduce groundwater levels and increase salinity.
Surface Water Resources	No impacts to surface water resources. Contract total, water to be made available, time for delivery, point of diversion, responsibility for water diversion, water measurement, and rates and methods of payment do not differ substantially from No-Action Alternative.	No impacts to surface water resources. Contract total, water to be made available, time for delivery, point of diversion, responsibility for water diversion, water measurement, and rates and methods of payment would not differ substantially from No-Action Alternative.
Surface Water Quality	No impacts to surface water quality. Continued operation of conveyance and distribution facilities would not degrade water quality when compared to the No-Action Alternative.	No impacts to surface water quality. Continued operation of conveyance and distribution facilities would not degrade water quality when compared to the No-Action Alternative.
Biological Resources	No adverse impacts to fish, vegetation and wildlife. Contract renewal would continue water deliveries accommodating land uses existing under the No-Action Alternative. No habitat supporting special-status species would be converted to agricultural, municipal, or industrial use when compared to the No-Action Alternative.	No adverse impacts to fish, vegetation, and wildlife. Contract renewal would continue water deliveries accommodating land uses existing under the No-Action Alternative. No habitat supporting special-status species would be converted to agricultural, municipal, or industrial use when compared to the No-Action Alternative.

Tiered water pricing in the No-Action Alterative is based upon the use of an "80/10/10 Tiered Water Pricing from Contract Rate to Full Cost" approach including appropriate ability-to-pay limitations. The terms *Contract Rate* and *Full Cost Rate* are defined by CVP rating setting policies and PL 99-546 and the Reclamation Reform Act, respectively. The Contract Rate for irrigation and M&I water includes the contractor's allocated share of CVP main project operation and maintenance (O&M) expenses, O&M deficit, if any, and capital cost. The contract rate for irrigation water does not include interest on capital. The contract rate for M&I water includes interest on capital, computed at the CVP M&I interest rate. The Full Cost Rate for irrigation and M&I water includes the interest at the Reclamation Reform Act interest rate. Under this approach, the first 80 percent of maximum contract total would be priced at the applicable Contract Rate. The next 10 percent of the contract volume would be priced at a value equal to the average of the Contract Rate and Full Cost Rate. The final 10 percent of the contract volume would be priced at Full Cost Rate.

In addition to the CVP water rate, contractors are required to pay CVP Restoration Fund[1] payments on all deliveries of CVP water. Reclamation law and policy provides full or partial relief to irrigation contractors on Restoration Payments and the capital rate component of the water rate. Ability-to-pay relief, relative to the irrigation water rate, is fully applicable only to the first 80 percent of the contract total. Ability-to-pay relief is not applicable to the third tier water rate. The second tier may reflect partial relief. Ability-to-pay relief is equal to the average of the first and third tiers. The relief could be up to 100 percent of the capital cost repayment and is based upon local farm budgets. The ability to pay does not apply to CVP O&M costs, M&I water costs, or any non-CVP costs. No contractor considered in the EA presently receives ability-to-pay relief.

The prices of CVP water used in the No-Action Alternative are based upon 1994 irrigation and M&I CVP water rates.

DEFINITION OF M&I WATER

In CVP contracts for irrigation and M&I purposes, including both Alternatives 1 and 2, the definition of M&I water has usually been "water other than Irrigation Water." Both a 1982

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[1] The "Central Valley Project Restoration Fund" was established in the Treasury of the United States by Section 3407(a) of the CVPIA. The CVP Restoration Fund receives revenues provided under CVPIA Sections 3404(c)(3), Renewal of Existing Long-Term Contracts—mitigation and restoration payments; 3405(f), Increased Revenues—from repayments for contracts transferred from irrigation use to M&I use; 3406(c)(1), San Joaquin and Stanislaus Rivers—surcharges for the development of the comprehensive plan for fish, wildlife, and habitat restoration; and 3407(d), Adjustment and Assessment of Mitigation and Restoration Payments.

Reclamation policy and contract terms further indicate that M&I water is water for human use and for purposes such as watering landscaping or animals, as compared to commercial agricultural use.

The definition of M&I users was established in portions of a 1982 Reclamation policy memorandum. In many instances, the term *municipal users* is easily defined. However, with respect to small tracts of land, the 1982 memorandum defined *agricultural water* as agricultural water service to tracts that can support $5,000 gross income for a commercial farm operation. The memorandum indicates that this criterion can be met by parcels greater than two acres. Based on this analysis, the CVP has generally applied a definition of five acres or less for M&I uses in the CVP for many years. The CVP contractors can seek a modification for a demonstrated need of agricultural use on parcels between two and five acres in size from the Contracting Officer.

WATER CONSERVATION

Water Conservation Guidelines implemented under the Reclamation Reform Act of 1982 have been in effect for CVP contractors. Reclamation policy has required contractors under continuing long-term water service contracts to comply with the Water Conservation Guidelines developed under the CVPIA and to submit water conservation plans. The water conservation assumptions in the No-Action Alternative include water conservation actions for municipal and on-farm uses assumed in the CDWR Bulletin 160-93 and the water conservation plans. Such criteria address cost-effective Best Management Practices that are "economical and appropriate," including measurement devices, pricing structures, demand management, public information, and financial incentives. While measurement and pricing structures are required, they are not held to the "economical and appropriate" test.

WATER MEASUREMENT

The No-Action Alternative includes water measurement at every turnout or connection to measure CVP water deliveries. It is assumed that if other sources are commingled with the CVP water, including groundwater or other surface waters, the measurement devices would report gross water deliveries. Additional calculations would be required to determine the exact quantity of CVP water. However, if groundwater or other surface waters are delivered by other means to the users, the No-Action Alternative did not include additional measurement devices except as required by the individual user's water conservation plan (as described below).

ALTERNATIVE 1

Alternative 1 is based upon the proposal presented by the CVP water service contractors to Reclamation in April 2000. However, several issues included in the April 2000 proposal could not be included in Alternative 1 because they are not consistent with existing federal or state requirements or would require a separate federal action, as described below.

- The April 2000 proposal includes terms and conditions to provide a highly reliable water supply of a high water quality and provisions to improve the water supply capabilities of the CVP facilities and operations to meet this goal. *These issues were not included in Alternative 1 because they would require additional federal actions with separate environmental documentation and could be construed to limit the Secretary's efforts to achieve a reasonable balance among competing demands, as required by the CVPIA. Currently, Reclamation is completing a plan to restore project yield in accordance with Section 3408(j) of the CVPIA and under the CALFED program.*

- The April 2000 proposal includes language to require renewal of contracts after 25 years upon request of the contractor. *The study period for this EA is 25 years, which coincides with the contract period applicable to irrigation contracts required by CVPIA. Renewal after 25 years would be a new federal action and would require new environmental documentation.*

- The April 2000 proposal did not include provisions for compliance with biological opinions, but did include a provision requiring compliance with all applicable laws.

- The April 2000 proposal included provisions for water transfers. *It is recognized that water transfers will continue and that the CVP long-term water service contracts will provide the mechanisms for the transfers. However, it would be difficult to identify all of the water transfer programs that could occur with CVP water in the next 25 years. Reclamation would continue with separate environmental documents for transfers, establishing criteria to allow rapid technical and environmental review of proposed transfers.*

- The April 2000 proposal acknowledged the existing agreement for transfer of O&M responsibilities for project facilities with a non-federal entity. *There is no federal action involved in that provision of the long-term water service contract that requires analysis in this EA.*

- The April 2000 proposal includes provisions for resolving disputes. *Assumptions for resolution of disputes were not included in Alternative 1 because they do not appear to affect environmental conditions.*

- The April 2000 proposal includes parameters for Reclamation to approve proposed changes in contractor boundaries. *The study area in this EA for the long-term renewal process is defined by the existing service area boundaries of the contractors identified as being in the DMC Unit. Changes in contractor boundaries that also would propose changes in the CVP service area would be a new federal action requiring separate environmental documentation and Contracting Officer approval.*

- The April 2000 proposal includes provisions for expansion of the CVP service areas by the existing CVP water contractors. *The study area for the long-term contract renewal process is defined by the existing service area boundaries. Expansion of the service area boundaries would be a new federal action and would require separate environmental documentation and approval.*

The April 2000 proposal did include several provisions that were different than the assumptions for No-Action Alternative and these provisions are included in Alternative 1, as summarized in Table 2-1.

The April 2000 proposal also included several language changes that would not significantly modify CVP operations in a manner that would affect the environment as compared to the No-Action Alternative, but could affect specific operations of a contractor, as described in Table 2-1.

It should be noted that the tiered pricing assumptions (including unit prices for CVP water) and definition of M&I users in Alternative 1 would be the same as in the No-Action Alternative.

ALTERNATIVE 2

Alternative 2 is based upon the proposal presented by Reclamation to the CVP water service contractors in November 1999. However, several provisions included in the November 1999 proposal could not be included in Alternative 2 because they would require a separate Federal Action, as described below.

- The November 1999 proposal included provisions for the contractor to request approval from Reclamation of proposed water transfers. *It is recognized that transfers of O&M requirements to the group of contractors will continue and that*

the CVP long-term water service contracts will provide the mechanisms for such transfers. However, it would be difficult to identify all of the O&M transfer programs that could occur with CVP water in the next 25 years. Reclamation would require separate environmental documents for such transfers.

- The November 1999 proposal includes provisions for transfer of O&M responsibilities to third parties. *The November 1999 proposal acknowledged an agreement to transfer O&M responsibilities for project facilities to a non-federal entity. There is no federal action involved in that provision of the long-term water service contract that requires analysis in this EA.*

The November 1999 proposal did include several provisions that were different than the assumptions for No-Action Alternative and included in Alternative 2, as summarized below and in Table 2-1. The primary differences are related to tiered pricing and the definition of M&I users.

TIERED WATER PRICING

Tiered water pricing in Alterative 2 is based upon a definition of Category 1 and Category 2 water supplies. Tiered water pricing is defined under the No Action Alternative discussion. *Category 1* is defined as the quantity of CVP water that is reasonably likely to be available for delivery to a contractor and is calculated on an annual basis as the average quantity of delivered water during the most recent five-year period. For the purposes of this alternative, the Category 1 water supply is defined as the "contract total." *Category 2* is defined as that additional quantity of CVP water in excess of Category 1 water that may be delivered to a contractor in some years. Under Alternative 2, the first 80 percent of the Category 1 volume would be priced at the applicable Contract Rate for the CVP. The next 10 percent of the Category 1 volume would be priced at a rate equal to the average of the Contract Rate and Full Cost Rate as defined by Reclamation law and policy. The terms *Contract Rate* and *Full Cost Rate* are defined by the Reclamation Reform Act and are discussed above under Tiered Pricing for the No-Action Alternative. The Contract Rate is equal to O&M expenses, O&M deficit, if any, and capital costs without interest on capital. The Full Cost Rate includes the interest charges. The final 10 percent of the Category 1 volume would be priced at the Full Cost Rate as required by the CVPIA. All Category 2 water, when available, would be priced at the Full Cost Rate. It should be noted that Category 1 and Category 2 volumes will change every year based upon the average deliveries for the "most recent 5 years," with limited exception, based upon the findings of the water needs assessment. Alternative 2 assumes that the sum of Category 1 and Category 2 water is equal to the maximum quantity included in the contractor's existing water service contract. The quantity is the same as the

No-Action Alternative and Alternative 1. The same ability-to-pay adjustments would be applicable to CVP Restoration Fund payments and tiered water rates as described in the No-Action Alternative.

DEFINITION OF M&I WATER

The definition of M&I water includes water used on all tracts of five acres or less, unless the Contracting Officer is satisfied that the use of such water meets the definition of "irrigation water."

ALTERNATIVES CONSIDERED BUT ELIMINATED

NONRENEWAL OF LONG-TERM WATER SERVICE CONTRACTS

Nonrenewal of the current long-term water service contracts is considered infeasible based on Section 3404(c) of the CVPIA. This alternative was considered but eliminated from analysis in this EA because Reclamation has no discretion not to renew the contracts.

FUTURE CONTRACT RENEWALS

The analysis in this EA also does not include future subsequent long-term water service contract renewals. Future water service contract renewals will be subject to conditions and mutually agreeable terms. A future water service contract renewal is a separate action. Before any future water service contract is executed, Reclamation and the contractor must comply with all applicable law.

REDUCTION IN CONTRACT AMOUNTS

A reduction of contract amounts was considered in certain cases, but rejected from analysis for several reasons. First, water needs assessments have been completed for the 13 contractors meeting the criteria for the completion of a water needs assessment. In all cases, these assessments demonstrate that the entire contract quantity has been put to beneficial use, and in almost all cases, both the current and projected demands equal or exceed the current total contract amount. Second, reductions in contract quantities are not required for Reclamation to implement the CVPIA or any other statutory or water rights obligations. The contracts contain shortage provisions that insulate Reclamation from liability when it imposes shortages because of legal obligations. Thus, the contract provides Reclamation with the flexibility to implement such CVPIA provisions as the dedication of water to fish, wildlife, and habitat restoration under Section 3406(b)(2) and to achieve a reasonable balance between different project purposes as envisioned by the CVPIA. Third, permanently reducing contract amounts for a 25-year term in order to express current constraints on CVP delivery capability would reduce opportunities for contractors to make investments for good water management, such as in storage or banking

facilities, that will be of benefit in higher water years; would inhibit wet year transfer arrangements that can stabilize local demands without requiring new water development; and would negatively impact the contractors' capacity to achieve contract repayment. Similarly, capturing current delivery constraints as permanent reductions in water supplies is inconsistent with related activities, such as the CALFED Record of Decision and Yield Increase Plan.

PREFERRED ALTERNATIVE

The Preferred Alternative is based upon the final negotiated contact language. It also represents a negotiated position between Alternative 1 and Alternative 2, the "bookends" for the analysis in this EA. Some of the key provisions of the Preferred Alternative include:

- The final negotiated contract assumes that CVP water has been relied upon and considered essential by contractors. It also assumes that the Secretary, through coordination, cooperation, and partnership, will pursue measures to improve water supply.

- The final negotiated contract includes provisions for water transfers. It assumes that continuation of water transfers with the rate for transferred water being the transferor's rate for additional or reduced costs related to transfer and adjusted to remove any ability-to-pay-relief.

- Similar to Alternative 1, the final negotiated contract applies tiered water pricing to 80 percent and above the total contract quantity.

- The final negotiated contract assumes that contracts shall be renewed subject to certain conditions for agricultural water and unconditioned for M&I water. Ten years after the date of execution of the contract and every five years thereafter during the term of the contract, the Contracting Officer shall determine whether the relevant portion of the contract can be converted to a contract under subsection 9(d) of the Reclamation Project Act of 1939, pursuant to the Act of July 2, 1956 (70 Stat 483). Concurrently, the Contracting Officer shall also determine whether the relevant portion of this contract could be converted to a contract under subsection 9(c)(1) of the Reclamation Act of 1939.

- The final negotiated contract assumes that the CVP will operate in accordance with existing rules without obligations to operate towards water quality goals.

- The final negotiated contract includes provisions for expansion of the CVP service areas by the CVP contractors; however, unlike Alternative 1, it does not impose a time limit for assumed consent.

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

Chapter 3
Affected Environment, Environmental Consequences, and Environmental Commitments

February 2005

CHAPTER 3

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND ENVIRONMENTAL COMMITMENTS

INTRODUCTION

This chapter analyzes impacts resulting from the implementation of Alternatives 1 and 2 when compared to the No-Action Alternative. The specific provisions of these alternatives are summarized in Chapter 2 of this EA. This chapter does not analyze impacts for which it would not be reasonable to assume that significant impacts could occur. Specifically, potential impacts to transportation, noise, hazards/hazardous materials, and public services, utilities, and service systems are not analyzed, because it would not be reasonable to assume that the action of renewing long-term contracts could result in impacts to these resources and services.

Sections 3.1 through 3.13 analyze the environmental effects associated with long-term contract renewals in the areas of agriculture, socioeconomics and power resources, land use, air quality, soils and geology, groundwater, surface water resources, biological resources, cultural resources, recreational resources, visual resources, and public health. Each resource section begins with a discussion of the affected environment for that particular resource area and then analyzes the environmental impacts of the action alternatives (Alternative 1, Alternative 2, and the Preferred Alternative) as compared to the No-Action Alternative. Mitigation is discussed in the following resource sections as appropriate, if impacts expected to result from the implementation of Alternative 1 or 2 could be avoided or reduced through such mitigation.

Each resource section concludes with a discussion of cumulative impacts. A cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.8).

SECTION 3.1: CONTRACTOR SERVICE AREA DESCRIPTIONS

This section describes the service areas for the 20 contractors analyzed in this document that receive CVP water from the Delta-Mendota Canal. The study area, shown on Figure 3.1-1, includes portions of San Joaquin, Stanislaus, Merced, and Fresno Counties. Specifically, the study area includes the service areas of the following irrigation districts, water districts, and other contractors:

- Banta-Carbona Irrigation District
- Broadview Water District
- Centinella Water District
- City of Tracy
- Coehlo Family Trust Property
- Del Puerto Water District
- Eagle Field Water District
- Fresno Slough Water District
- James Irrigation District
- Laguna Water District
- Tranquillity Public Utilities District
- Mercy Springs Water District
- Oro Loma Water District
- Patterson Irrigation District
- Plain View Water District
- Reclamation District #1606
- The West Side Irrigation District
- Tranquillity Irrigation District
- West Stanislaus Water District
- Widren Water District

DMC UNIT CONTRACTORS' FACILITIES AND WATER USE

This section provides a general description of the contractors within the DMC Unit and a discussion of both the CVP and other available water supplies to them. The information provided for the individual districts is summary information only. For example, the sections titled "Operating Rules and Procedures" address only surface or subsurface drainage systems and transfers. In addition, individual districts have rules regarding the terms for delivery of water that require that water be put to reasonable and beneficial use and require compliance with Reclamation law.

BANTA-CARBONA IRRIGATION DISTRICT'S FACILITIES AND WATER USE

Because low rainfall conditions had created potential dry-farming crop failures, farmers and landowners wanting to remain in business banded together and organized the Banta-Carbona Irrigation District, which was officially formed on March 14, 1921. The district

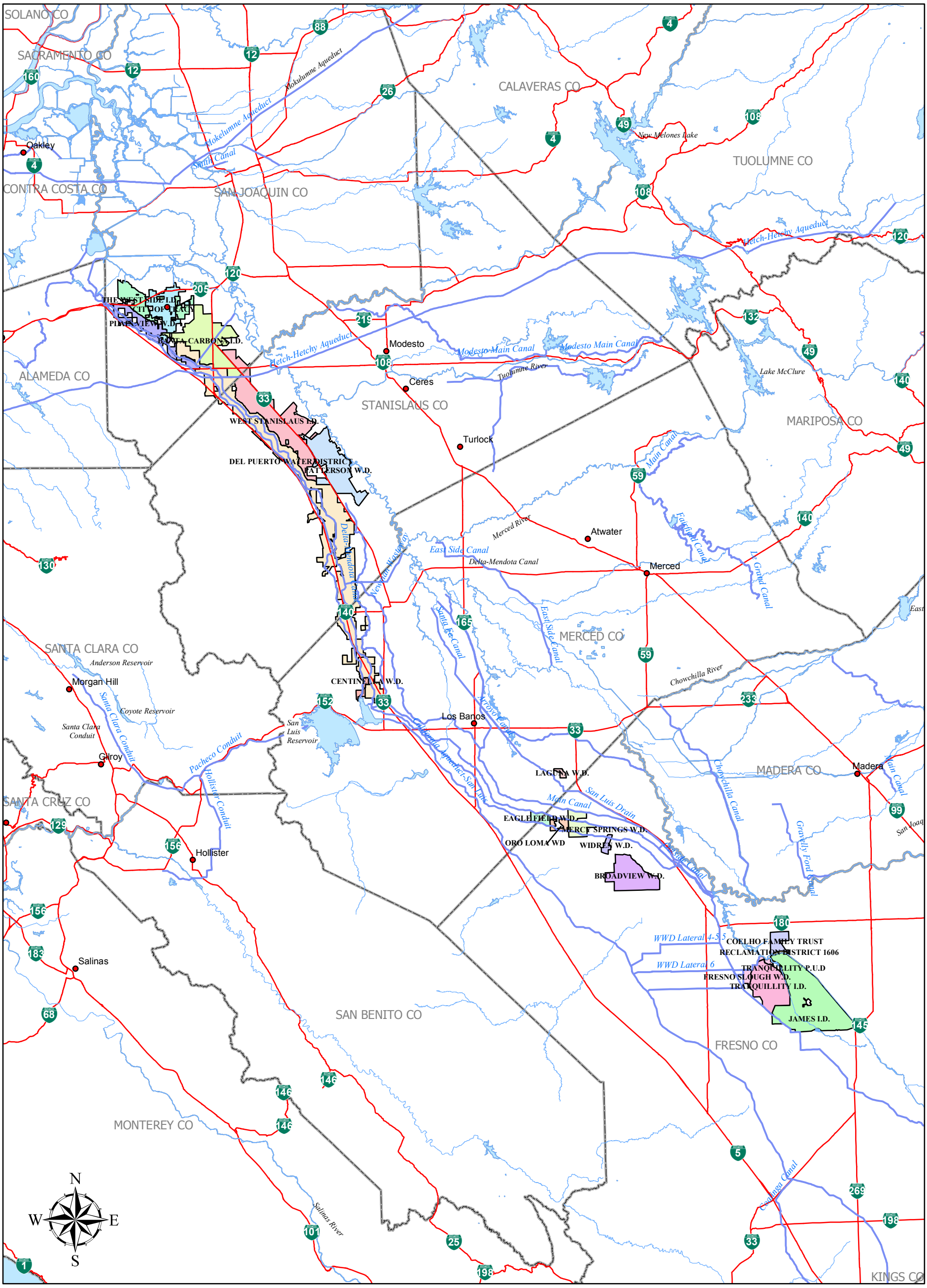

Figure 3.1-1 Long Term Contract Renewal: Central Valley Project, Delta Mendota Canal Unit

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This map is intended to be a graphical representation only.
It is not a legal document and is not intended to be used as such.
The Bureau of Reclamation gives no guarantee,
expressed or implied, as to the accuracy or reliability of the data.

was originally about 15,500 acres in size with no irrigated acres and is currently about 17,000 acres in size with 15,841 irrigated acres. The district is located in San Joaquin County just south of the city of Tracy and is adjacent to the Del Puerto Water District to the southwest and the West Stanislaus Water District to the southeast. Figures 3.1-2 and 3.1-3 show the current land use/land cover and boundary for the Banta-Carbona Irrigation District service area.

The distribution system in the Banta-Carbona Irrigation District consists of 2.5 miles of unlined canal, 33.2 miles of concrete-lined canal, and 46 miles of underground pipeline. CVP water from the Delta-Mendota Canal is gravity-fed through two turnouts and is then distributed through a pipeline connected to the Banta-Carbona Main Lift Canal. All of the district's facilities are either pump or gravity delivery canals. Currently, all gates within the district are manually operated and all the turnouts are measured daily.

Use of CVP Water

On February 14, 1969, Banta-Carbona Irrigation District entered into a long-term contract (Contract 14-06-200-4305A) with Reclamation for 25,000 acre-feet of CVP supply. The contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-4305A-IR8) was executed on February 27, 2004, and will remain in effect for two years.

Use of Other Available Water Supplies

The district also receives water supply from the Delta. This supply was originally a very dependable, high quality water source that has gradually degraded as more permits for water rights were granted and the water supply ran short to meet the new diversion quantities. The quality and reliability of the Delta water has continued to worsen. Water from the Delta and CVP water are the only water supplies available to the district.

Operating Rules and Regulations

District policy requires all landowners to have either tailwater pumpback systems to recycle their tailwater or ponds to settle silt before the water is drained back into a district lateral for reuse. As a result, the Banta-Carbona Irrigation District's system is closed and no water escapes the district.

In addition to the policies stated in this section, the Banta-Carbona Irrigation District requires that all water delivered be put to reasonable and beneficial use. If water is wasted or improperly used, the watermaster may refuse further delivery or water until the cause of waste is removed. Water users are required to maintain their ditches and facilities for conveying water in good condition, free from weeds and foul growth, so that water can be

used without undue loss or waste of water or time. Water users pay for water on a per acre-foot basis on water actually delivered.

Banta-Carbona Irrigation District is also active in water transfers and has previously transferred water to The West Side Irrigation District, West Stanislaus Irrigation District, Panoche Water District, Broadview Water District, and Westlands Water District. Banta-Carbona Irrigation District has also informed Reclamation that it has transferred a portion of its CVP supply to the City of Tracy. Reclamation recently approved a contract assignment of 5,000 acre-feet per year from Banta-Carbona Irrigation District to the City of Tracy.

BROADVIEW WATER DISTRICT'S FACILITIES AND WATER USE

A group of landowners and farmers originally within the Westlands Water District pulled out and formed Broadview Water District on August 16, 1955. Broadview Water District is located on the west side of the San Joaquin Valley and is approximately five miles west of the city of Firebaugh, in Fresno County. The district is approximately 9,515 acres in size with 9,067 irrigated acres. All of the land in the district is high quality production land. There is no marginal agricultural land in the district. Figures 3.1-4 and 3.1-5 show the current land use/land cover and boundary for the Broadview Water District service area.

Originally, the distribution system in Broadview Water District consisted of a single pipeline that connected to the Delta-Mendota Canal and ran two miles to the district boundaries. Six lift pump stations and six booster pumps were later constructed to lift and distribute the water within the district service area. Later, in the 1960s, the distribution system was reconstructed to increase its capacity. Currently, the Broadview Water District's distribution system consists of 30 miles of open unlined canals and laterals, two miles of pipeline, and six pumping stations with a total of 36 pumps. All the water is lifted from the Delta-Mendota Canal into the district's main canal delivery system. The only storage facility in the Broadview Water District is the main canal, which consists of six pumping stations and five ponds. All the laterals from the main canal are gravity-fed. The main canal is automated and all of the laterals have manual gates. All turnouts on the system are metered.

Use of CVP Water

On November 27, 1959, Broadview Water District entered into a long-term contract (Contract 14-006-200-8092) with Reclamation for 16,000 acre-feet of CVP water. In May 1964, after the capacity of the district's distribution system was increased, the 1959 contract was amended. Under the new contract (Contract 14-06-200-8092 Amendatory),

Reclamation would provide 27,000 acre-feet of CVP water to the district. The amended contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-8092-IR8) was executed on February 27, 2004, and can remain in effect for two years.

A small portion of the CVP water is used in Broadview Water District is used for M&I purposes (i.e., to provide drinking water in the district). This water is delivered through the San Luis Canal through two turnouts in the Westlands Water District distribution system.

Use of Other Available Water Supplies

CVP water is the only water supply source for the Broadview Water District. There is one groundwater well located in the district, but it is inoperable. The groundwater is unusable because of its relatively high levels of salt and boron.

Operating Rules and Regulations

The district has drainage problems caused by impervious clay layers that restrict the downward movement of shallow groundwater containing salts and boron. As a result, a subsurface drainage system has been installed. The drainage system has 18 miles of open drain channels, 2.1 miles of pipeline, and three lift stations with nine pumps. There are also 25 tile drain systems that are owned by various landowners. Water users recycle their drainage water with surface irrigation water and reapply it to their fields. In addition, the district has historically drained discharge water through the Grassland Water District and into the San Joaquin River. Currently, as part of the GBP, Broadview Water District is required to remove its drainage water from the Grasslands Channels and convey the water through the San Luis Drain and into the San Joaquin River at the same point.[1]

As part of a land management program to reduce drain water and improve wildlife habitat, Broadview Water District is evaluating alternative crop rotation options for reducing volumes of drainage water. As part of the study, drains are being monitored and based on the study results, cropping patterns and irrigation management changes are being imposed. The program has been implemented through the use of a Reclamation grant.

Broadview Water District is actively transferring water to other districts. Because many water users farm in both the Broadview Water District and other districts, it is the district's

[1] The primary goals of the GBP are to remove the unusable agricultural drainage water from water delivery channels and ditches in the Grassland Water District and to provide an opportunity to collect the drainage water from a large agricultural area and place it in a single conveyance facility for transport to the San Joaquin River.

policy to allow water users to transfer any portion of their allocation to their water accounts in other districts, provided the transfer does not significantly impact Broadview Water District operations.

CENTINELLA WATER DISTRICT'S FACILITIES AND WATER USE

Formed in 1964, Centinella Water District is located on the northern end of the San Luis Reservoir in Merced County and is adjacent to Del Puerto Water District to the north and east. The district is approximately 850 acres in size with 840 irrigated acres. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. Figures 3.1-6 and 3.1-7 show the current land use/land cover and boundary for the Centinella Water District service area.

The district receives its CVP supply directly through a turnout on the Delta-Mendota Canal. This district does not have any distribution facilities and does not own any pumps, pipelines, or canals to transport the CVP supply. All turnouts, pumps, pipelines, and canals in the district are privately owned, maintained, and operated. All drainage systems are also privately developed, operated, and maintained by individual landowners.

Use of CVP Water

The district operated under a temporary contract with Reclamation until a permanent cost-of-service type contract was executed. On July 8, 1977, Centinella Water District signed a long-term contract (Contract 7-07-20-W0055) with Reclamation to supply 2,500 acre-feet of CVP water. The contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. The most recent renewal interim contract (Contract 7-07-20-W0055-IR8) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

CVP water is the district's only water supply source.

Operating Rules and Regulations

Because all the distribution and drainage systems are owned, operated, and maintained by individual water users, the district has not instituted a drainage policy. The district, however, maintains a cooperative stance with downslope districts regarding problems arising from tailwater leaving district boundaries and will take necessary actions to remedy such problems.

The district's policy on water transfers is to allow transfers of allocated water supply between parcels of land, either within the district or between districts, when the supply is

associated with lands owned by the same landowner. Therefore, the only water transfers outside the district are transfers from a landowner to itself.

CITY OF TRACY'S FACILITIES AND WATER USE

The city of Tracy is located in the central San Joaquin Valley at the junction of Interstate 5 and Interstate 580, providing fast and easy access to both the San Francisco Bay Area and up and down the Central Valley. Tracy is a rapidly changing community with a population of nearly 48,000. One of seven cities in San Joaquin County, Tracy is also one of the fastest growing cities in the county. Its population is expected to grow to approximately 85,000 by the year 2010. Figures 3.1-8 and 3.1-9 show the current land use/land cover and boundary for the City of Tracy service area.

The City of Tracy receives its CVP supply from a turnout on the Delta-Mendota Canal. Because the CVP water is used for M&I purposes, it must be treated before delivery. The treatment process for the CVP supply consists of chemical oxidation, coagulation, flocculation, filtration, and chlorination. In addition, chloramines (the combination of chlorine and a small amount of ammonia) are used as the residual disinfectant in the water distribution system. The CVP water is transferred by pipeline to the water treatment plant and, after treatment, transferred by pipeline to M&I users.

Use of CVP Water

On July 22, 1974, the City of Tracy signed a long-term contract (Contract 14-06-200-7858A) with Reclamation for 10,000 acre-feet of CVP water. This contract is scheduled to expire in 2008. On February 27, 2004, the City of Tracy, the United States, and the West Side Irrigation District entered into an agreement for an assignment of 2,500 acre-feet of contract supply from the West Side Irrigation District to the City of Tracy. The City of Tracy also retains the option of exercising its right to obtain a future assignment of an additional 2,500 acre-feet of project water now available for delivery to The West Side Irrigation District under the district's existing contract.

Use of Other Available Water Supplies

The City of Tracy's water system includes CVP water from the Delta-Mendota Canal and groundwater pumped from nine groundwater wells located throughout the city. There are no other water supply sources serving the city; however, the City of Tracy has negotiated a permanent transfer of a portion of The West Side Irrigation District's CVP supply to help meet Tracy's growing demand. The West Side Irrigation District has also assigned 5,000 acre-feet per year to the City of Tracy. In addition, the South County Water Supply Program, which is a cooperative effort of the South San Joaquin Irrigation District and the Cities of Manteca, Escalon, Lathrop, and Tracy, has been designed to provide

supplemental water supplies to the cities. Construction of facilities necessary to provide the supplemental supply is currently under way and is scheduled to be completed by the summer of 2005 (South County Water 2004). The Banta-Carbona Irrigation District has transferred a portion of its CVP supplies and has assigned an additional 5,000 acre-feet per year to the City of Tracy.

COEHLO FAMILY TRUST'S FACILITIES AND WATER USE

About 1,128 acres of the Coehlo Family Trust property are currently under contract with Reclamation to receive CVP water. Because of its small size, the trust is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. The property receives its CVP allocation directly from the Mendota Pool and conveys the water through its own distribution system to the property. Figures 3.1-10 and 3.1-11 show the current land use/land cover and boundary for the Coehlo Family Trust property.

The Coehlo Family Trust signed a long-term contract (Contract 14-06-200-7589A) with Reclamation to supply 3,525 acre-feet of CVP water until December 23, 2003. A binding agreement for early renewal of CVP water was signed on September 30, 1997 (Contract 14-06-200-7859A-BA).[2] The most recent interim renewal contract (Contract 14-06-200-7859-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

In addition to its CVP supply, the Coehlo Family Trust property has groundwater wells that provide a supplemental supply in dry years. The Coehlo Family Trust also had 5,200 acre-feet of supplemental water and 2,653 acre-feet of Schedule 2 water for water rights.[3] It subsequently assigned 3,120 acre-feet of the supplemental water and 1,321 acre-feet of Schedule 2 water to the CDFG.

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[2] An additional mitigation and restoration payment of 150 percent of the annual payment calculated under the CVPIA is required for long-term contractors whose contracts were in existence on October 30, 1992, but had not been renewed between January 1, 1988, and October 29, 1992. However, since the PEIS was not completed by October 1, 1997, the additional mitigation and restoration payment does not apply to long-term contractors with a contract in existence on the date of CVPIA enactment (October 30, 1992) who enter into a binding agreement with the Secretary prior to October 1, 1997, to renew their contracts immediately upon completion of the PEIS, if such contract has not expired prior to completion of the PEIS.

[3] Schedule 2 water is all water delivered without charge under the authority of Section 14 of the Reclamation Project Act of 1939, as a permanent adjustment and settlement of a district's asserted claims to water in the Fresno Slough tributary to the San Joaquin River in fulfillment of such rights pursuant to Contract No. I7R-1145, "Contract for Purchaser of Miller & Lux Water Rights," dated July 27, 1939.

DEL PUERTO WATER DISTRICT FACILITIES AND WATER USE

Del Puerto Water District was originally organized on March 24, 1947, and included approximately 3,875 acres. The district was reorganized on March 1, 1995, through a formal consolidation with ten other districts.[4] The reorganized Del Puerto Water District is located on both sides of the Delta-Mendota Canal and consists of a narrow strip of land averaging less than two miles in width and stretching 50 miles in length. Del Puerto Water District includes approximately 47,400 acres, of which 45,773 are irrigable acres, located along the west side of Stanislaus, San Joaquin, and Merced Counties. Stanislaus County serves as the principal county for the district. Figures 3.1-12 and 3.1-13 show the current land use/land cover and boundary for the Del Puerto Water District service area.

The district receives its CVP supply directly through turnouts on the Delta-Mendota Canal. This district does not have any distribution facilities and does not own any pumps, pipelines, or canals to transport the CVP supply. All turnouts, pumps, pipelines, and canals in the district are privately owned, maintained, and operated. The district owns and maintains only the water meters.

Use of CVP Water

On June 10, 1953, Del Puerto Water District signed a long-term contract (Contract 14-06-200-922) with Reclamation for 10,000 acre-feet of CVP water. After the 1995 consolidation, the water service contracts of the other ten districts were assigned to Del Puerto Water District and were subsequently renegotiated as a single contract. Under the single contract, Del Puerto received 140,210 acre-feet of CVP water. Since the expiration of those individual contracts, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-922-IR10) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Del Puerto Water District has no groundwater wells and does not receive water supplies from any source other than the CVP.

Operating Rules and Regulations

All of the distribution and drainage systems in the Del Puerto Water District are owned, operated, and maintained by individual water users; therefore, the district has not instituted a drainage policy. The district, however, maintains a cooperative stance with downslope

[4] Districts consolidated to form Del Puerto Water District are Hospital, Kern Canon, Salado, Sunflower, Orestimba, Foothill, Davis, Mustang, Quinto, and Romero Water Districts.

districts regarding problems arising from tailwater leaving district boundaries and will take necessary actions to remedy such problems.

The district's policy on water transfers is to allow transfers of allocated water supply between parcels of land, either within the district or between districts, when the supply is associated with lands owned by the same landowner. Therefore, the only water transfers outside the district are transfers from a landowner to itself.

EAGLE FIELD WATER DISTRICT'S FACILITIES AND WATER USE

Eagle Field Water District is approximately 1,372 acres in size, of which 1,366 acres are irrigable. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. The district is located in both Merced and Fresno Counties between the Outside Canal and the Delta-Mendota Canal. Figures 3.1-14 and 3.1-15 show the current land use/land cover and boundary for the Eagle Field Water District service area.

Eagle Field Water District receives its CVP water supply directly from two turnouts on the Delta-Mendota Canal. The district has no additional conveyance facilities.

Use of CVP Water

On April 10, 1958, the district signed a long-term contract (Contract 14-06-200-7754) with Reclamation for 4,550 acre-feet of CVP water. The contract expired on February 25, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-7754-IR8) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

In addition to CVP supply, Eagle Field Water District has groundwater wells that provide a supplemental supply in dry years.

Operating Rules and Regulations

Eagle Field Water District is part of the Panoche Drainage District. The drainage district, which is composed of Panoche, Eagle Field, Oro Loma, and Mercy Springs Water Districts, was formed in the late 1950s to transport subsurface drainage water and tailwater from district lands. Historically, the Panoche Drainage District discharged drainage water through the Grassland Water District and into the San Joaquin River. Currently, the drainage district participates in the GBP and the land within Eagle Field Water District is operated to reduce and manage drainage to meet the load targets for the GBP.

Eagle Field Water District is active in water transfers and in the past has transferred water to other districts including Panoche Water District.

FRESNO SLOUGH WATER DISTRICT'S FACILITIES AND WATER USE

The Fresno Slough Water District is about 1,200 acres in size, of which 805 acres are irrigable. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. The district is located in western portion of Fresno County and is adjacent to Tranquillity Irrigation District to the east. Figures 3.1-16 and 3.1-17 show the current land use/land cover and boundary for the Fresno Slough Water District service area.

After the Delta-Mendota Canal releases water into the Mendota Pool, some of the supply then flows from the pool into the Fresno Slough (or Kings River Bypass). The Fresno Slough Water District lifts its allocation of CVP water from the Fresno Slough into its own distribution system, which consists of approximately seven miles of unlined canals and two lift pump locations with two pumps at each lift. Fresno Slough Water District distributes the water to a number of unmetered turnouts.

Use of CVP Water

On July 1, 1955, the Fresno Slough Water District signed a long-term contract (Contract 14-06-200-4019A) with Reclamation for 4,000 acre-feet of water from the Delta-Mendota Canal. The contract expired in 2003. Since then a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-4019-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

In addition to CVP supplies, the district receives 866 acre-feet of Schedule 2 water for a water rights settlement. The district owns a one-tenth ownership interest in a groundwater well. No groundwater recharge program is currently in place and the quality of the groundwater is poor with high salinity.

Operating Rules and Regulations

The district is active in transfers of water both in and out of the district. Typically, any transfers out of the district would first be offered to neighboring Tranquillity Irrigation District. Fresno Slough Water District has also transferred a portion of its CVP contract water to the Westlands Water District in the past.

JAMES IRRIGATION DISTRICT'S FACILITIES AND WATER USE

Formed in February 1920, James Irrigation District is about 41.2 square miles in size. About 17,500 acres are irrigable. The district is located within the central portion of the San Joaquin Valley, about 30 miles southwest of Fresno in Fresno County. Most of the land in the district was part of a land grant received by pioneer Jefferson G. James in 1858. Land in the district is relatively flat and soils range from coarse sands to heavy clays. Soils in the middle and western portions of the district generally have a higher clay content. Figures 3.1-18 and 3.1-19 show the current land use/land cover and boundary for the James Irrigation District service area.

James Irrigation District's distribution system consists of 91.5 miles of unlined canal, 14.3 miles of lined canal, and 6 miles of pipeline. The main canal operates as a lift canal for surface water that is pumped from the Mendota Pool into the Fresno Slough (or Kings River Bypass). A series of booster stations located along the distribution system then feed the various laterals and sublaterals. The entire length of the main canal is unlined. All but three of the 356 turnouts in the district are measured and read daily.

The district also has a regulation reservoir with a capacity of about 100 acre-feet and a storage reservoir with a capacity of about 900 acre-feet. James Irrigation District hopes to use these facilities to increase the amount of Kings River flood release water that is used for groundwater recharge to offset overdraft conditions. However, since the facilities have been in place, no water has been available for groundwater recharge.

Use of CVP Water

James Irrigation District is one of the last contractors to obtain CVP water that has flowed from the Mendota Pool into Fresno Slough (or Kings River Bypass). On December 23, 1963, James Irrigation District entered into a long-term contract (Contract 14-06-200-700-A) with Reclamation for 35,300 acre-feet of CVP water. The contract expired in 2003. Since then a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-700-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Historically, James Irrigation District has received its water supply from the Kings River through a series of canals built in the late 1800s. However, the Kings River water supply was not reliable, and as one of the last districts along the river, it was also one of the last to receive water. In dry years, little or no water was available. The district also built a canal from the San Joaquin River. San Joaquin River water was also not very reliable and the supply was available only when flows exceeded the needs of other users. After Friant

Dam was completed in 1944, the district began pumping San Joaquin River water directly from the Mendota Pool on an annual basis until August 1 of each year, with no limit on quantity. After the Delta-Mendota Canal was completed in 1951, the CVP supply replaced the district's water supply.

The district has been a member of the Kings River Water Association since 1921. In 1963, James Irrigation District entered into agreements with Reclamation and the Kings River Water Association to establish entitlements to surface water from the San Joaquin and Kings Rivers. As a result, the district received an allocation of riparian water from the San Joaquin River that is delivered without charge as a settlement of the district's water rights claims in Fresno Slough. The amount of water delivered varies, depending on whether the year is normal, wet, or dry. The district also traded all of its allocation of scheduled Kings River water to the Lower Kings River Water Association in exchange for agreed-upon payments to the district. Since these agreements, the district receives Kings River water only when flood releases are made. In the next few years, the district plans to purchase portable lift pumps to deliver Kings River flood releases (when available) to farms east of the district for in-lieu groundwater recharge and to use the regulation and storage reservoirs.

In addition to these surface water sources, groundwater is used as a supplemental supply. All but two wells are district-owned. The district generally uses all available surface water supplies and then pumps groundwater to make up for any shortfall. Groundwater is pumped mostly along the eastern boundary of the district because groundwater in other areas is of poorer quality with high salinity and contamination plumes.

James Irrigation District also receives operational spill water from the Fresno Irrigation District, which is used for agricultural use. In past years, Reclamation has also made surplus water available to the district. This water either is imported from the Delta through the Delta-Mendota Canal or is a San Joaquin River Flood Release (called "Section 215" water by Reclamation). James Irrigation District also receives 9,700 acre-feet of Schedule 2 water for water rights.

Operating Rules and Regulations

Growers in James Irrigation District are permitted to pump tailwater back into district canals, allowing the tailwater to be recycled and reused in the district's system. This activity must be coordinated with the district's responsible ditchtender.

James Irrigation District is also active in water transfers to and from other CVP contractors and other members of the Kings River Water Association. The district, however, has not allowed individual growers to transfer their CVP allocation from land farmed within the

district to land owned by the same individual but farmed outside of the district. The district would generally not approve water transfers that result in an overall loss of water that could have been used within the district.

LAGUNA WATER DISTRICT'S FACILITIES AND WATER USE

Laguna Water District is approximately 417 acres in size, all of which are irrigable, and is located in Fresno County. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. Figures 3.1-20 and 3.1-21 show the current land use/land cover and boundary for the Laguna Water District service area.

Laguna Water District has no distribution facilities of its own. Instead, the district has a contract with the Central California Irrigation District for transportation of its CVP water. The Delta-Mendota Canal releases water into the Mendota Pool and water is then transported from the pool to the Laguna Water District through the distribution facilities of the Central California Irrigation District.

Use of CVP Water

On May 26, 1982, the district signed a long-term contract (Contract 2-07-20-W0266) with Reclamation for 800 acre-feet of CVP water. This contract expired on December 31, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 2-07-20-W0266-IR8) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

The district has no water supplies other than the CVP allocation.

TRANQUILLITY PUBLIC UTILITY DISTRICT

On October 11, 1967, Melvin D. and Mardella Hughes entered into a contract with the United States for water service to a tract of approximately 66 acres located near the colony of Tranquillity in Fresno County (Contract 14-06-200-3537A). A binding agreement with the United States for water service and early renewal of the existing contract was signed September 30, 1997. The Tranquillity Public Utility District assumed the contract for Settlement Water (93 acre-feet) and Supplemental Supply (70 acre-feet) of CVP Water from the Mendota Pool on August 29, 2003. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. The property, now owned by Tranquillity Public Utility District, lies adjacent to Fresno Slough. Figures 3.1-22 and 3.1-23 show the current land use/land cover and boundary for the Tranquillity Public Utility District.

The CVP water is lifted from the Fresno Slough and Mendota Pool and is distributed to the approximately 32 farmable acres within the District.

Use of CVP Water

Since the expiration of the original contract, which was assumed by Tranquillity Public Utility District in 2003, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-3537-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

The District has no other source of water supply other than the CVP allocation

MERCY SPRINGS WATER DISTRICT'S FACILITIES AND WATER USE

Mercy Springs Water District is approximately 3,390 acres in size, of which 3,336 acres are irrigable. The district is located in Fresno County and spans the Main Canal, Outside Canal, and the Delta-Mendota Canal. Figures 3.1-24 and 3.1-25 show the current land use/land cover and boundary for the Mercy Springs Water District service area.

The district receives its CVP water directly from a turnout on the Delta-Mendota Canal and has no additional conveyance facilities.

Use of CVP Water

On June 21, 1967, the district signed a long-term contract (Contract 14-06-20-3365A) with Reclamation for 13,300 acre-feet of CVP water. This contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. On May 14, 1999, the district assigned 6,260 acre-feet of its contract water supply to the Pajaro Valley Water Management Agency, Westlands Water District, and Santa Clara Valley Water District, leaving a balance of 7,040 acre-feet of supply subject to this long-term contract. On March 1, 2003, the district assigned an additional 4,198 acre-feet of its contract supply to the Westlands Water District Distribution District No. 2, leaving a balance of 2,842 acre-feet of supply subject to this long-term contract. The most recent interim renewal contract (Contract 14-06-200-3365A-IR8A) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

In addition to its CVP supply, Mercy Springs Water District has groundwater wells that provide a supplemental supply in dry years.

Operating Rules and Regulations

Mercy Springs Water District is part of the Panoche Drainage District. The Panoche Drainage District, which is composed of Panoche, Eagle Field, Oro Loma, and Mercy Springs Water Districts, was formed in the late 1950s to transport subsurface drainage water and tailwater from district lands. Historically, the drainage district discharged drainage water through the Grassland Water District and into the San Joaquin River. Currently, the Panoche Drainage District participates in the GBP and that portion of Mercy Springs Water District that uses CVP water is operated to reduce and manage drainage to meet the load targets for the GBP.

Panoche Drainage District now owns the portion of Mercy Springs Water District from which the CVP water has been assigned and has begun a regional drainage management program. With the assistance of Reclamation grants, Panoche Drainage District is developing portions of the Mercy Springs Water District into alternative land management by changing historical cropping rotations. Portions of Mercy Springs Water District will be planted to trees or alfalfa, bermuda grass, and other salt-tolerant grasses that will be irrigated with well water and subsurface drainage water from Panoche Drainage District and other areas served by the GBP. The area will be used to establish the sustainability and feasibility of salt-tolerant grass for the continuous use of blended subsurface drainage water.

Historically, Mercy Springs Water District has been active in water transfers.

ORO LOMA WATER DISTRICT'S FACILITIES AND WATER USE

Oro Loma Water District is located in Fresno County between the Outside Canal and the Delta-Mendota Canal. It contains 1,080 irrigable acres. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. Figures 3.1-26 and 3.1-27 show the current land use/land cover and boundary for the Oro Loma Water District service area.

Oro Loma Water District receives its CVP water directly from two turnouts on the Delta-Mendota Canal and has no additional conveyance or distribution facilities.

Use of CVP Water

On April 7, 1959, the district signed a long-term contract (Contract 14-06-200-7823) with Reclamation for 4,600 acre-feet of CVP water. This contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-7823-IR8) was executed on February 7, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

In addition to CVP supply, Oro Loma Water District has groundwater wells that provide a supplemental supply in dry years.

Operating Rules and Regulations

Oro Loma Water District is part of the Panoche Drainage District. The drainage district, which is composed of Panoche, Eagle Field, Oro Loma, and Mercy Springs Water Districts, was formed in the late 1950s to transport subsurface drainage water and tailwater from district lands. Historically, the Panoche Drainage District discharged drainage water through the Grassland Water District and into the San Joaquin River. Currently, the Panoche Drainage District participates in the GBP, and the land within Oro Loma Water District is operated to reduce and manage drainage to meet the load targets for the GBP.

Oro Loma Water District is active in water transfers and in past years has transferred water to other districts, including Panoche Water District.

PATTERSON IRRIGATION DISTRICT'S FACILITIES AND WATER USE

The Patterson Water District was formed in November 1955 at an original size of approximately 15,000 acres. After a series of exclusions, the size of the district in 1996 was 13,543.7 acres, all of which is irrigated. After being formed, Patterson Water District later changed to Patterson Irrigation District[5]. Patterson Irrigation District is located in Stanislaus County and is adjacent to West Stanislaus Irrigation District to the northwest and Del Puerto Water District to the southwest. The district includes 425 landowners and over 600 water users. Figures 3.1-28 and 3.1-29 show the current land use/land cover and boundary for the Patterson Irrigation District service area.

The Patterson Irrigation District distribution system consists of 3.8 miles of unlined canal, 51.8 miles of concrete-lined canal, and 84 miles of pipeline. The main canal flows from east to west and the main laterals that come off the main canal and flow to the north and south. The district also has a series of lift pump stations, four reservoirs that are located off the main canal, and two smaller reservoirs located off the main laterals. Originally designed as settling basins to settle out silt from San Joaquin River source water, the reservoirs have negligible storage capacity.

[5] The primary differences between irrigation and water districts are the range of purposes underlying their formation, eligible lands, and voting systems.

Use of CVP Water

On December 18, 1967, Patterson Irrigation District entered into a long-term contract (Contract 14-06-200-3598A) with Reclamation for 16,500 acre-feet of CVP water. This contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-3598A-IR8) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

In addition to its CVP supply, Patterson Irrigation District receives local surface water from the San Joaquin River and pumps groundwater. The district's San Joaquin River and groundwater supply sources have high concentrations of salt that limit cropping patterns and affect water quality conditions and crop yields. Salinity conditions in the river have been well documented by the RWQCB. The district also receives an additional 6,000 acre-feet of replacement water from Reclamation because CVP water allocations have reduced San Joaquin River flows.

Operating Rules and Regulations

Patterson Irrigation District has aggressively pursued an automation and modernization plan since 1997 that is expected to continue in the future. Modernization efforts include replacing less efficient pumps and motors and constructing Replogle flumes for accurate flow measurement and long-crested weirs for water level control. As they are implemented, these efforts will continue to increase the efficiency of the district's system.

Through a funding program provided by Reclamation, Patterson Irrigation District is actively working with the Irrigation Training and Research Center at California Polytechnic State University on developing a canal automation system that would include flowmeters and volumetric options for measuring flow rate.

Any tailwater or drainage water return flows in the district either percolate into the groundwater aquifer or end up in the San Joaquin River via direct drain facilities. A small quantity also enters Del Puerto Creek. Most of the tailwater reaching the San Joaquin River is reused. Approximately one-half of the return flows enter the San Joaquin River upstream of the district's diversion and, therefore, are available for reuse by the district. The other one-half enters the San Joaquin River downstream of the district's diversion and is available to other downstream users. The reuse of return flows either within the district or by other users promotes good water management by conserving water.

Patterson Irrigation District is active in water transfers both into and out of the district. In recent years, water has been transferred to West Stanislaus Irrigation District and Westlands Water District.

PLAIN VIEW WATER DISTRICT'S FACILITIES AND WATER USE

Plain View Water District was formed on January 15, 1951. The district is located in San Joaquin County primarily along the eastern side of Interstate 5 near the city of Tracy. The district was originally 6,000 acres in size with 5,316 irrigated acres and is currently 6,422 acres in size with 1,851 irrigated acres. Figures 3.1-30 and 3.1-31 show the current land use/land cover and boundary for the Plain View Water District service area.

Plain View Water District receives its CVP water directly from the Delta-Mendota Canal through 28 turnouts. The district's distribution system consists of 9.2 miles of pipeline. The system is an entirely enclosed pipeline system constructed of reinforced concrete pipe and polyvinyl chloride pipe that was installed to replace the original Techite pipe. There are no open ditches or canals in the system. Propeller meters measure the flow volume to each point of delivery.

Use of CVP Water

On May 22, 1953, Plain View Water District entered into a long-term contract (Contract 14-06-200-785) with Reclamation for 17,250 acre-feet of CVP water. In 1974, the district annexed additional land and the contract was amended on July 25, 1975. Under the amendment, Reclamation provided 20,600 acre-feet of CVP water to the district. The long-term contract expired on February 28, 1994. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-785-IR10 was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Plain View Water District currently has no water supply source other than its CVP supply.

Operating Rules and Regulations

There is no subsurface drainage in Plain View Water District. The drainage is either recirculated on-farm or discharged to either the Delta-Mendota Canal or The West Side Irrigation District for reuse.

Plain View Water District is active in transferring water both to and from other contractors.

RECLAMATION DISTRICT #1606'S FACILITIES AND WATER USE

Reclamation District #1606 is approximately 170 acres in size. Because of its small size, the district is exempt from Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. The district is located in Fresno County and is adjacent to James Irrigation District. It was originally formed for flood protection along the Kings River. In 1914, Reclamation District #1606 constructed two channels along its neighboring district, James Irrigation District, to make a continuous connection from the Kings River to the San Joaquin River, to pass floodwater through the area, and to prevent flooding of the two districts. Figures 3.1-32 and 3.1-33 show the current land use/land covers and boundary for the Reclamation District #1606 service area.

The Delta-Mendota Canal releases water into the Mendota Pool, and some of this supply then flows into the Fresno Slough (or Kings River Bypass). Reclamation District #1606 pulls its CVP supply from the Fresno Slough using two lift pumps.

Use of CVP Water

On April 12, 1968, Reclamation District #1606 signed a long-term contract (Contract 14-06-200-3802A) with Reclamation for 228 acre-feet of CVP water until December 23, 2003. A binding agreement for an early renewal contract (Contract 14-06-200-3802A-BA) was executed with Reclamation on September 30, 1997. The most recent interim renewal contract (Contract 14-06-200-3802-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Reclamation District #1606 also receives 342 acre-feet of Schedule 2 water for water rights. The district has no other water supply sources.

THE WEST SIDE IRRIGATION DISTRICT'S FACILITIES AND WATER USE

The West Side Irrigation District was organized on October 12, 1915, and made its first water deliveries in 1919. The district is located in San Joaquin County and is divided in half by the City of Tracy. The district was originally about 12,160 acres in size with 10,800 irrigated acres and is currently 9,436 acres in size with 6,083 irrigated acres. Figures 3.1-34 and 3.1-35 show the current land use/land cover and boundary types for the West Side Irrigation District service area.

Current West Side Irrigation District policy requires water users requesting M&I water service and annexation into the City of Tracy to detach from the district and to continue to provide agricultural water to the property until it is developed for urban uses.

CVP water is diverted from the Delta-Mendota Canal through two turnouts. One turnout ties into the district's upper main canal through a 1.8-mile-long concrete pipe and the second turnout ties into the district's upper main canal through a 1.4-mile-long concrete pipe. Both are gravity flow systems. The upper main canal is nine miles in length (including one mile of concrete-lined canal, 3.5 miles of pipeline and 4.5 miles of unlined canal) and includes 11 miles of concrete piped laterals. The lower main canal is also nine miles in length (including 1.5 miles of concrete-lined canal, 3 miles of pipeline, and 5.5 miles of unlined canal) and includes 13 miles of concrete piped laterals. All of the gates in the system are manual and all flows in the district's distribution system are measured regularly.

Use of CVP Water

In June 1977, The West Side Irrigation District entered into a long-term contract (Contract 7-07-20-W-0045) with Reclamation for 7,500 acre-feet of CVP supply. This new contract expired on February 28, 1995. Since then, a series of interim renewal contracts have been executed. On February 27, 2004, the district, the United States, and the City of Tracy entered into an agreement for an assignment of 2,500 acre-feet of its contract supply to the City of Tracy, leaving a balance of 5,000 acre-feet subject to this long-term contract. The most recent interim contract (Contract 7-07-20-W0045-IR8) was executed on February 27, 2004, and can remain in effect for two years. The district's contract also allows the City of Tracy to exercise its right to obtain a future assignment of an additional 2,500 acre-feet of project water available to the district under the existing contract, which, if exercised, may reduce the contract balance accordingly. The balance of this long-term contract for The West Side Irrigation District has not been reduced to account for this potential future assignment to the City of Tracy.

Use of Other Available Water Supplies

The district has received water from the San Joaquin River from water rights dating back to 1916. San Joaquin River water is diverted through a dredged unlined intake canal and flows by gravity into the district's pumping facilities. The water is then lifted through two pipelines; one terminates at the beginning of the Lower Main Canal and the other discharges into the Upper Main Canal and mixes with CVP water. The water then flows by gravity, similar to the CVP supply, and is delivered to users. San Joaquin River water is used as the district's main supply, with CVP water supplies used as a supplement during peak periods or when needed to improve water quality.

There are no groundwater or private irrigation wells within the district. The district has no water supplies other than CVP and San Joaquin River water.

Operating Rules and Regulations

The West Side Irrigation District has a tailwater return flow collection (surface drainage) system to provide drainage to all the lands within the district. No drainage (or tailwater) leaves The West Side Irrigation District boundaries. The district has constructed facilities to collect drainage water and return it to the district's intake canals, where it is combined with San Joaquin River water and pumped back into the conveyance facilities for reuse. Minor quantities of tailwater from Plain View Water District and Byron-Bethany Irrigation District may be received into district facilities.

The West Side Irrigation District is active in water transfers. Transferred water has been received water from other districts, including the Banta-Carbona Irrigation District, and water has been transferred to other districts, including Plain View Water District. The West Side Irrigation District has also transferred a portion of its CVP water supply and has assigned 5,000 acre-feet per year to the City of Tracy.

TRANQUILLITY IRRIGATION DISTRICT'S FACILITIES AND WATER USE

Formed in 1918, Tranquillity Irrigation District is approximately 10,750 acres in size, of which about 9,700 are irrigated. The district is located in the west central portion of Fresno County; its principal community is the unincorporated town of Tranquillity. The district does not currently have a water conservation plan as required by Section 3405(e) of the CVPIA. The district is preparing a water conservation plan, which must be approved by Reclamation before the district can renew its long-term contract.

The Delta-Mendota Canal releases water into the Mendota Pool, and some of this supply then flows into the Fresno Slough (or Kings River Bypass). The district then lifts its allocation of CVP water from the Fresno Slough into its own distribution system, which consists of 42 miles of unlined canal, 10 miles of pipelines, two major lift pump stations, and a series of lifts. The entire system is automated and metered on all incoming supplies and individual turnouts. The district is constantly seeking ways to upgrade and improve its distribution system, including low interest loans and bond money, including water conservation bond money to convert open canals in the district to pipelines. Figures 3.1-36 and 3.1-37 show the current land use/land cover and boundary for the Tranquillity Irrigation District service area.

Use of CVP Water

On December 23, 1963, Tranquillity Irrigation District signed a long-term contract (Contract 14-06-200-701A) with Reclamation for 13,800 acre-feet of water until December 23, 2003. A binding agreement for an early renewal of CVP water (Contract 14-06-200-701-A-BA) was signed on September 30, 1997. The most recent

interim renewal contract (Contract 14-06-200-701-A-IR2) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Tranquillity Irrigation District has six groundwater wells that are used as a backup supply during periods of high demand. The district also maintains two deep groundwater wells for the domestic water system serving the community of Tranquillity. No individual landowners own or operate any deep groundwater wells. The district has riparian rights to water from both the Kings and San Joaquin Rivers. However, because of its location, the riparian supplies are not very reliable. Therefore, in 1963, the district entered into agreements with Reclamation and the Kings River Water Association to establish entitlements to surface water from the Kings and San Joaquin Rivers. As a result, the district receives an allocation of the up to 20,200 acre-feet of CVP water that is delivered without charge as a settlement of the district's water rights claims to water in the Fresno Slough tributary to the San Joaquin River. The district traded all of its allocation of scheduled Kings River water to the Lower River Users of the Kings River Water Association in exchange for agreed-upon payments, which the district uses to pay for the CVP contract discussed under "Use of CVP Water" above.

Operating Rules and Regulations

District policy allows transfers both into and out of the district. Under this policy, the district has historically engaged in transfers both in and out with other CVP contractors, including James Irrigation District, Westlands Water District, San Luis Water District, Panoche Water District, the Coehlo Family Trust (also known as the Traction Ranch Water District), and Fresno Slough Water District. It has also participated in other transfer activities including water purchased from the State Drought Water Bank.

WEST STANISLAUS WATER DISTRICT'S FACILITIES AND WATER USE

West Stanislaus Irrigation District was formed on May 20, 1920, and has been in continuous operation since. Located in portions of both Stanislaus and San Joaquin Counties, the district overlies a portion of the San Joaquin Valley groundwater basin, in the northern portion of the Delta-Mendota Basin, and the southern portion of the Tracy Basin, which is drained by the San Joaquin River. The first water deliveries were made in 1929. The current size of the district is 24,800 acres, of which 19,762 acres are irrigated. The district is adjacent to Banta-Carbona Irrigation District to the north, Patterson Irrigation District to the south, and Del Puerto Water District to the west. Figures 3.1-38 and 3.1-39 show the current land use/land cover and boundary for the West Stanislaus Water District service area.

The West Stanislaus Irrigation District distribution system consists of a three-mile-long, concrete-lined main canal and 84 miles of laterals and sublaterals that are either canals or pipelines. Sixty-eight of these 84 miles are either concrete-lined canals or concrete pipe. The main canal carries water supplied by six pumping plants. The district receives water from the Delta-Mendota Canal through two diversion points.

The district has a continuous monitoring system to accurately measure water diverted into the laterals. The water measurements are taken three times daily at the water user's turnouts. Control structures in the laterals control the level of water and regulate the flow.

CVP Water Supply

On July 14, 1953, West Stanislaus Irrigation District signed a long-term contract (Contract 14-06-200-1072) with Reclamation for 20,000 acre-feet of CVP water. The contract amount was increased to 50,000 acre-feet in 1976. The contract expired on February 28, 1994. Since then, a series of interim renewal contracts have been executed. The most recent interim renewal contract (Contract 14-06-200-1072-IR10) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

Since 1929, West Stanislaus Irrigation District has had the right to divert water from the San Joaquin River. However, after construction of Friant Dam and the diversion of river water to the southern part of the valley, the quantity available to the district became inadequate and the quality has continued to degrade and become more saline. The district also uses four groundwater wells, drilled in 1977, as a supplemental water source during peak demands. However, use of these wells is limited because of high pumping costs and water quality concerns. Some landowners within West Stanislaus Irrigation District own private groundwater wells to service their properties.

Operating Rules and Regulations

West Stanislaus Irrigation District has a surface drainage system to collect tailwater. All of the surface drainage eventually finds its way to the San Joaquin River. The water that flows in the natural channels goes directly to the river and the other facilities discharge onto riparian land adjacent to the river, which enhances the riparian habitat.

West Stanislaus Irrigation District allows water transfers into and out of the district.

WIDREN WATER DISTRICT'S FACILITIES AND WATER USE

Widren Water District is approximately 883 acres in size and is located in Fresno County on the Delta-Mendota Canal. Because of its small size, the district is exempt from

Section 3405(e) of the CVPIA, which requires the preparation of a water conservation plan. Figures 3.1-40 and 3.1-41 show the current land use/land cover and boundary for the Widren Water District service area.

The district has one turnout on the Delta-Mendota Canal and no other improvements.

Use of CVP Water

On September 25, 1959, the district signed a long-term contract (Contract 14-06-200-8018) with Reclamation for 2,990 acre-feet of CVP water. Since the contract expired on February 28, 1995, Widren Water District has been receiving CVP water under an interim renewal contract with Reclamation. The most recent interim renewal contract (Contract 14-06-200-8018-IR8) was executed on February 27, 2004, and can remain in effect for two years.

Use of Other Available Water Supplies

The district has no water supplies other than its CVP allocation.

Operating Rules and Regulations

Widren Water District has been draining discharge water (or tailwater) through the Grassland Water District and into the San Joaquin River. Currently, as part of the GBP, the Widren Water District is required to remove its drainage water from the Grasslands Channels and convey the water through the San Luis Drain and into the San Joaquin River at the same point. The district is an active participant in water transfers and has transferred water to Westlands Water District in past years.

INTERPRETATION OF FIGURES 3.1-2 THROUGH 3.1-41

The maps were generated in ArcMap, using the contractor boundaries provided by contractor and the consolidated place of use boundaries. The contractors' service areas are the areas within the consolidated place of use. An intersect of the district-provided boundaries and consolidated place of use boundaries was done to determine the service areas.

SECTION 3.2: AGRICULTURE

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on agricultural productivity in the DMC Unit. Methods of analysis are described below.

AFFECTED ENVIRONMENT

Renewal of the long-term water service contracts could potentially affect the following agricultural resources:

- Income from agricultural production (both gross and net)
- Irrigated acres under production

The study area includes the geographic service areas of the 20 CVP water contractors within the DMC Unit, as previously described in Section 3.1.

The contractor service areas all run roughly along the Interstate 5/California Aqueduct corridor from the City of Tracy in San Joaquin County in the north, through parts of Stanislaus and Merced Counties, to the northern portion of Fresno County, just south of U.S. Highway 180 to the south. The farmland served by much of this water lies in the heart of California's Central Valley, one of the most productive agricultural regions in the world.

Agricultural products grown or raised in the unit are extremely varied. The Central Valley of California boasts not only a wide variety of agricultural products, but also exceptional productivity of the crops and livestock produced here. From alfalfa to zucchini, if it is grown somewhere in North America, it is probably grown somewhere in the Central Valley. Fruits, nuts, and vegetables are particularly noteworthy crops in the area because of the lack of substitute growing regions elsewhere.

In terms of product volume and value, hay, corn silage, sugar beets, and cotton are the dominant field crops; grapes and almonds are the dominant orchard crops; tomatoes are the dominant row crop; and dairy and poultry are the dominant livestock products in San Joaquin, Stanislaus, Merced, and Fresno Counties.

Agricultural producers in the Central Valley and elsewhere operate under several economic pressures. When it comes to the sale of their product, they are "price-takers." Because no producer has enough market share to exercise any control over the market, the price they receive for their products is determined entirely outside their control.

The agricultural production cycle is not rapid. Decisions regarding a producer's product mix have to be made months or even years in advance. When July arrives and it is evident that corn is going to be more profitable to produce that year than tomatoes would be, it is too late for the producer to change what they will produce for that year. If tomatoes were planted, tomatoes will be harvested. In the case of orchards, the production cycle stretches across many years.

Weather greatly impacts the quantity and quality of agricultural production. Certainly, no producer has control over the weather.

Changes in the cost or availability of production inputs also play a large part in the ability of a producer to remain viable. Land, labor, seed, machinery, fertilizers, and water are all important and interrelated components in determining production decisions and enterprise profitability. A decrease in the availability of water or an increase in the cost of water or both can not only decrease or eliminate profits per acre, it can also determine cropping patterns or the ability to utilize other inputs, such as land.

ENVIRONMENTAL CONSEQUENCES

This section describes the environmental impacts of the action alternatives as compared to the No-Action Alternative. Impacts are identified by comparing program components of each action alternative to the No-Action Alternative. The project alternatives are described more fully in Chapter 2.

Impacts are presented for the project area as a whole (i.e., for the entire DMC Unit). This level of aggregation is required due to the use of the Central Valley Production Model (CVPM) as the best available analytical tool. As further described later in this section (under the No-Action Alternative discussion), the CVPM provides output data only at the subregion level, not at the individual contractor or local level. As with all impacts within the project area, the concentration of impacts to a smaller geographic area within the project area increases the relative impact, while a more uniform dispersion of impacts across the project area decreases the relative impact. While it is highly unlikely that all identified impacts would present themselves within a single water district, it is just as unlikely that a fully uniform dispersion of impacts across the entire project area would occur.

While this assessment is not able to geographically pinpoint the location of impacts within the project area, it is likely that greater impacts could be seen in those areas where fewer opportunities to substitute water resources occur. If that is the case, then impacts may be more concentrated among those water districts where CVP water is the only available surface water source and where groundwater resources are limited. Such districts include

Broadview Water District, Centinella Water District, Del Puerto Water District, Laguna Water District, Plain View Water District, Reclamation District #1606, Tranquillity Public Utilities District, and Widren Water District.

In the case of agricultural impacts, there can also be the issue of relative severity to individual producers. The same level of change resulting from implementation of an alternative will cause different degrees of impact to different producers. As an example, taking ten acres of orchard out of production will likely cause a much larger impact to a producer who has only 30 acres in production than it will to a producer who has 1,000 acres in production.

NO-ACTION ALTERNATIVE

As described in Chapter 2, the No-Action Alternative provides a base condition for comparing Alternatives 1 and 2 and represents future conditions at a projected level of development without implementation of either alternative. The No-Action Alternative reflects the conditions that are expected to be present upon implementation of the Preferred Alternative from the CVPIA PEIS.

The data used to describe the No-Action Alternative conditions and those of the two renewal alternatives can be found in the April 24, 2000 Technical Memorandum titled *Economic Analysis of November 1999 Tiered Pricing Proposal for PEIS Preferred Alternative* (CH2M Hill, 2000), attached as Appendix A. It is important for the reader to understand the key assumptions contained in the April 24, 2000 Technical Memorandum.

The economic analysis in the April 24, 2000 Technical Memorandum evaluates agricultural economics using the CVPM. As previously described, the CVPM provides analyses for specific subregions, not by individual water district. The CVPM subregions contained in the DMC Unit are subregions 9, 10, and 15 (a more detailed description of the subregions can be found in Table 1 of the April 24, 2000 Technical Memorandum, which is included as Appendix A).

Tiered pricing for the No-Action Alternative is based on the current contract amount of water. Tiered pricing is defined further in Chapter 2. Contractors may purchase, as available, 80 percent of their full contract amounts at the basic contract rate (Tier 1). The next 10 percent of the full contract amount (Tier 2) is priced at the midpoint between the basic contract rate and the full-cost rate (as defined in the Reclamation Reform Act). The last 10 percent of the full contract amount (Tier 3) is priced at the full-cost rate as defined in the Reclamation Reform Act. Table 3.2-1 shows the tiered water rates for each of the three CVPM subregions used for the No-Action Alternative. These rates are based on the 1992 CVP water rates.

Table 3.2-1
CVP Tiered Water Rates
Used in No-Action Alternative
(in dollars per acre-foot)

CVPM Subregion	Tier 1	Tier 2	Tier 3
9	$28.54	$35.25	$41.95
10	$33.46	$40.02	$46.57
15	$28.16	$34.88	$41.59

Source: CH2M Hill 2000, Table 3.

Using the tiered rates described in Table 3.2-1 and the farm budget assumptions within the CVPM, estimates of irrigated acreage and value of production for primary crops in each CVPM subregion were developed under average, wet, and dry water conditions. An average water year represents the average water delivery during the period 1922–1990 from the CVPIA PEIS Preferred Alternative; a wet water year represents the average delivery from the period 1967–1971 from the CVPIA PEIS Preferred Alternative; and a dry water year represents the average delivery from the period 1928–1934 from the CVPIA PEIS Preferred Alternative.

Table 3.2-2 describes the total irrigated acreage under the No-Action Alternative by primary crop and CVPM subregion in average, wet, and dry years. Table 3.2-3 describes the value of production under the No-Action Alternative by primary crop and CVPM subregion in average, wet, and dry years.

It is worth noting that within the No-Action Alternative tiered pricing structure and rate levels, very little change is seen in either irrigated acreage for the subregion or the value of crop production for the subregion from average to wet to dry water years.

ALTERNATIVE 1

Alternative 1 involves a tiered pricing program that is based on the full current contract amount of water. A complete description of Alternative 1 is provided in Chapter 2.

Agricultural resource use resulting from this alternative is assumed to be similar to the No-Action Alternative because, as described in Table 2-1, the amount of water delivered, the timing of these deliveries, and the rates and methods of payment for water delivered under Alternative 1 do not substantially differ from the No-Action Alternative.

Table 3.2-2
No-Action Alternative Irrigated Acreage by CVPM Subregion and Crop
(in thousands of acres)

CVPM Subregion	Crop Category	Average Year	Wet Year	Dry Year
9	Pasture	24.6	24.6	23.4
	Alfalfa	43.8	43.8	43.1
	Sugar Beets	28.6	28.6	28.5
	Other Field Crops	114.9	115.0	113.6
	Rice	0.9	0.9	0.9
	Truck Crops	46.0	46.0	46.0
	Tomatoes	42.5	42.5	42.3
	Deciduous Orchard	21.3	21.3	21.3
	Small Grain	96.8	97.5	93.7
	Grapes	5.8	5.8	5.8
	Subtotal	**425.2**	**426.0**	**418.6**
10	Pasture	13.3	13.3	13.3
	Alfalfa	40.8	40.9	40.8
	Sugar Beets	13.9	13.9	13.9
	Other Field Crops	48.2	48.2	48.3
	Rice	2.9	2.9	2.9
	Truck Crops	112.9	112.9	113.0
	Tomatoes	40.2	40.2	40.2
	Deciduous Orchard	36.6	36.6	36.6
	Small Grain	14.0	14.0	14.0
	Grapes	1.0	1.0	1.0
	Cotton	103.1	103.1	103.1
	Subtropical Orchard	0.1	0.1	0.1
	Subtotal	**427.0**	**427.1**	**427.2**
15	Pasture	3.9	3.9	3.7
	Alfalfa	83.1	83.4	80.6
	Sugar Beets	5.0	5.0	5.0
	Other Field Crops	86.0	86.1	84.2
	Rice	0.1	0.1	0.1
	Truck Crops	12.0	12.0	12.0
	Tomatoes	2.0	2.0	2.0
	Deciduous Orchard	38.0	38.0	38.0
	Small Grain	71.0	71.6	67.9
	Grapes	56.0	56.0	56.0
	Cotton	242.1	242.7	235.5
	Subtropical Orchard	1.0	1.0	1.0
	Subtotal	**600.2**	**601.8**	**586.0**
Total – All Subregions		**1,452.4**	**1,454.9**	**1,431.8**

Source: CH2M Hill 2000, Table 17.

Table 3.2-3
No-Action Alternative Value of Production by CVPM Subregion and Crop
(in millions of dollars)

CVPM Subregion	Crop Category	Average Year	Wet Year	Dry Year
9	Pasture	3.6	3.6	3.4
	Alfalfa	25.6	25.7	25.2
	Sugar Beets	22.0	22.0	21.9
	Other Field Crops	55.9	56.0	55.3
	Rice	0.7	0.7	0.7
	Truck Crops	190.8	190.8	190.6
	Tomatoes	64.9	65.0	64.8
	Deciduous Orchard	22.7	22.7	22.7
	Small Grain	30.7	30.9	29.7
	Grapes	10.0	10.0	10.0
	Subtotal	**426.9**	**427.4**	**424.3**
10	Pasture	3.1	3.1	3.1
	Alfalfa	23.6	23.6	23.6
	Sugar Beets	12.2	12.2	12.2
	Other Field Crops	31.0	31.0	31.0
	Rice	2.3	2.3	2.3
	Truck Crops	718.0	717.9	718.1
	Tomatoes	60.1	60.1	60.1
	Deciduous Orchard	52.4	52.4	52.4
	Small Grain	7.6	7.5	7.6
	Grapes	1.9	1.9	1.9
	Cotton	102.6	102.7	102.6
	Subtropical Orchard	0.4	0.4	0.4
	Subtotal	**1,015.2**	**1,015.1**	**1,015.3**
15	Pasture	0.9	0.9	0.9
	Alfalfa	51.3	51.4	49.7
	Sugar Beets	4.1	4.1	4.0
	Other Field Crops	51.2	51.3	50.2
	Rice	0.1	0.1	0.1
	Truck Crops	72.0	72.0	71.9
	Tomatoes	3.0	3.0	3.0
	Deciduous Orchard	58.7	58.7	58.7
	Small Grain	41.6	41.9	39.7
	Grapes	121.7	121.7	121.7
	Cotton	275.0	275.7	267.5
	Subtropical Orchard	3.7	3.7	3.7
	Subtotal	**683.3**	**684.5**	**671.1**
Total – All Subregions		**2,125.4**	**2,127.0**	**2,110.7**

Source: CH2M Hill 2000, Table 18.

ALTERNATIVE 2

Alternative 2 involves the application of a tiered pricing structure that differs from the No-Action Alternative in a few ways.

Tiered pricing for the Alternative 2 is based on a rolling five-year average of actual water deliveries, rather than the current contract amount of water. The five-year rolling average of actual deliveries is referred to as Category 1 water. Contractors may purchase, as available, 80 percent of their Category 1 water at the basic contract rate (Tier 1). The next 10 percent of their Category 1 water (Tier 2) is priced at the midpoint between the basic

contract rate and the full-cost rate (as defined in the Reclamation Reform Act). The last 10 percent of their Category 1 water (Tier 3) is priced at the full-cost rate (as defined in the Reclamation Reform Act).

Any difference between the full contract amount of water and the five-year rolling average of actual water deliveries is referred to as Category 2 water. To the extent that Category 2 water is available, contractors may purchase such water at Tier 3 prices.

Table 3.2-4 shows the tiered water rates for each of the three CVPM subregions used for Alternative 2. A key difference between the No-Action Alternative and Alternative 2 is that the Alternative 2 rates shown in Table 3.2-4 are based on CVP water rates presented in the November 17, 1999 financial workshop, not the 1992 CVP water rates used in the No-Action Alternative. This is done because the implementation of tiered pricing as a result of the PEIS means that tiered pricing is the law and that Alternative 2 rates should be compared to the most likely rate structure (in this case, the 1999 proposed CVP water rates). Alternative 1, a by-product of the PEIS, was compared to 1992 rates, consistent with the PEIS.

Table 3.2-4
CVP Tiered Water Rates Used in Alternative 2
(in dollars per acre-foot)

CVPM Subregion	Tier 1	Tier 2	Tier 3
9	$24.79	$55.14	$85.50
10	$31.15	$40.16	$49.16
15	$32.71	$41.91	$51.10

Source: CH2M Hill 2000, Table 2.

Tier 1 prices in subregions 9 and 10 are lower in Alternative 2 than in the No-Action Alternative. This difference in price level appears to help offset the more rigorous price structure of Alternative 2.

Another key difference in the analysis of Alternative 2 is the application of blended rates. It is assumed that the contractor will blend the rate of CVP water in any tier or category before selling the water to growers. This differs from the assumption used to assess alternatives in the PEIS, in which contractors were assumed to sell CVP water to growers at tiered rates.

Blended rates were developed for a series of nine water supply sequences:

- **Average-Average:** An average water year following a five-year sequence of average years.

- **Wet-Average:** An average water year following a five-year sequence of wet years.
- **Dry-Average:** An average water year following a five-year sequence of dry years.
- **Average-Wet:** A wet water year following a five-year sequence of average years.
- **Wet-Wet:** A wet water year following a five-year sequence of wet years.
- **Dry-Wet**: A wet water year following a five-year sequence of dry years.
- **Average-Dry:** A dry water year following a five-year sequence of average years.
- **Wet-Dry:** A dry water year following a five-year sequence of wet years.
- **Dry-Dry:** A dry water year following a five-year sequence of dry years.

The blended CVP water rates used for each of the nine sequences described above are shown below in Table 3.2-5.

Table 3.2-5
CVP Blended Water Rates Used in Alternative 2
(in dollars per acre-foot)

CVPM Subregion	Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Followed by Average			Followed by Wet			Followed by Dry		
9	33.89	24.79	64.53	55.27	33.89	73.22	24.79	24.79	33.89
10	33.85	31.15	42.94	38.01	33.85	44.63	31.15	31.15	33.85
15	35.47	34.55	38.10	36.34	35.47	38.82	33.07	32.71	35.47

Source: CH2M Hill 2000, Table 2.

Using the blended rates described in Table 3.2-5 and the farm budget assumptions within the CVPM, estimates of irrigated acreage and value of production for primary crops in each CVPM subregion were developed under each of the nine sequences described above. To determine the impacts of Alternative 2, as compared to the No-Action Alternative, sequences ending in an average, wet, or dry year are compared to the average, wet, or dry year No-Action Alternative results, respectively.

Table 3.2-6 presents the change in subregion irrigated acreage from the No-Action Alternative by primary crop and CVPM subregions in average, wet, and dry years. As can be seen in Table 3.2-6, the majority of impacts, adverse and beneficial, are experienced in CVPM subregion 9. The largest beneficial impact to the DMC Unit as a whole is a 3,000-acre increase (0.2 percent) in total irrigated acreage during a dry year. The largest adverse impact to the DMC Unit is a 1,600-acre decrease (0.1 percent) in total irrigated acreage during a wet year. Again, this can be explained partially because Tier 1 prices in

subregions 9 and 10 are lower in Alternative 2 than in the No-Action Alternative. This difference in price level appears to help offset the more rigorous price structure of Alternative 2.

Table 3.2-6
Change in Irrigated Acreage from No-Action Alternative by CVPM Subregion and Crop Resulting from Implementation of Alternative 2
(in thousands of acres)

CVPM Subregion	Crop Category	Change Compared to Average Year No-Action Alternative			Change Compared to Wet Year No-Action Alternative			Change Compared to Dry Year No-Action Alternative		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed by Average			Followed by Wet			Followed by Dry		
9	Pasture	-0.2	-0.2	-0.1	-0.4	-0.4	-0.4	0.7	0.7	0.7
	Alfalfa	-0.1	-0.1	0.0	-0.3	-0.3	-0.2	0.4	0.4	0.4
	Sugar Beets	0.0	0.0	0.0	-0.1	-0.1	0.0	0.1	0.1	0.1
	Other Field Crops	-0.2	-0.2	-0.2	-0.5	-0.5	-0.5	0.7	0.7	0.7
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3	1.0	1.0	1.0
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	-0.6	**-0.6**	**-0.4**	**-1.6**	**-1.6**	**-1.4**	**3.0**	**3.0**	**3.0**
10	Pasture	0.0	0.0	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	0.0	0.0	-0.3	-0.1	0.0	-0.1	0.0	0.0	0.0
	Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other Field Crops	0.0	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cotton	0.0	0.0	-0.5	-0.1	0.0	-0.1	0.0	0.0	0.0
	Subtropical Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	**0.0**	**0.0**	**-1.1**	**0.0**	**0.0**	**-0.1**	**0.0**	**0.0**	**0.0**
15	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other Field Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cotton	0.0	0.0	-0.2	0.0	0.0	-0.1	0.0	0.0	0.0
	Subtropical Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total – All Subregions		**-0.6**	**-0.6**	**-1.5**	**-1.6**	**-1.6**	**-1.5**	**3.0**	**3.0**	**3.0**

Source: CH2M Hill 2000, Table 17.

Table 3.2-7 presents the change in the value of production from the No-Action Alternative by primary crop and CVPM subregions in average, wet, and dry years. As can be seen in Table 3.2-7, the majority of impacts, adverse and beneficial, are experienced in CVPM

subregion 9. The largest beneficial impact to the DMC Unit as a whole is a $1.2 million (less than 0.1 percent) increase in total value of production during a dry year. The largest adverse impact to the DMC Unit is a $1.0 million decrease (less than 0.1 percent) in total value of production during an average year that follows a dry five-year period.

Table 3.2-7
Change in Value of Production from No-Action Alternative by CVPM Subregion and Crop Resulting from Implementation of Alternative 2
(in millions of dollars)

CVPM Subregion	Crop Category	Change Compared to Average Year No-Action Alternative			Change Compared to Wet Year No-Action Alternative			Change Compared to Dry Year No-Action Alternative		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed by Average			Followed by Wet			Followed by Dry		
9	Pasture	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.1	0.1	0.1
	Alfalfa	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.2	0.2	0.2
	Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
	Other Field Crops	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	0.3	0.3	0.3
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
	Tomatoes	0.0	0.0	0.0	-0.1	-0.1	0.0	0.1	0.1	0.1
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.3	0.3	0.3
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	**-0.2**	**-0.2**	**-0.1**	**-0.6**	**-0.6**	**-0.5**	**1.2**	**1.2**	**1.2**
10	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	0.0	0.0	-0.2	-0.1	0.0	-0.1	0.0	0.0	0.0
	Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other Field Crops	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cotton	0.0	0.0	-0.5	-0.1	0.0	-0.1	0.0	0.0	0.0
	Subtropical Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	**0.0**	**0.0**	**-0.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
15	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other Field Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Small Grain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Grapes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cotton	0.0	0.0	-0.2	0.0	0.0	-0.1	0.0	0.0	0.0
	Subtropical Orchard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	**0.0**	**0.0**	**-0.1**	**0.0**	**0.0**	**-0.1**	**0.0**	**0.0**	**0.0**
Total – All Subregions		**-0.2**	**-0.2**	**-1.0**	**-0.6**	**-0.6**	**-0.6**	**1.2**	**1.2**	**1.2**

Source: CH2M Hill 2000, Table 18.

Table 3.2-8 presents the change in net farm revenues from the No-Action Alternative by CVPM subregions in average, wet, and dry years. As can be seen in Table 3.2-8, the

largest beneficial impact to the DMC Unit as a whole is a $2.2 million increase in net farm revenues during a dry year that follows a dry five-year period. The largest adverse impact to the DMC Unit as a whole is a $700,000 decrease in net farm revenues during a wet year that follows a wet five-year period.

Table 3.2-8
Change in Net Farm Income from No-Action Alternative by CVPM Subregion Resulting from Implementation of Alternative 2
(in millions of dollars)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average Year No-Action Alternative			Change Compared to Wet Year No-Action Alternative			Change Compared to Dry Year No-Action Alternative		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed by Average			Followed by Wet			Followed by Dry		
9	Fallowed Land	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.2	0.2	0.2
	Groundwater Pumping	0.6	0.6	0.6	1.2	1.2	1.2	0.3	0.3	0.3
	Irrigation Cost	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	CVP Water Cost	-1.2	-1.2	-1.2	-2.0	-2.0	-2.0	-0.5	-0.5	-0.5
	Higher Crop Prices	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	-0.4	-0.4	0.1	-0.7	-0.7	-0.5	0.4	0.4	0.3
10	Fallowed Land	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping	0.0	0.0	6.8	8.3	0.8	8.6	-0.1	-0.1	-0.1
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.1	-0.4	-6.3	-7.9	-0.7	-8.1	-0.2	-0.2	0.1
	Higher Crop Prices	0.0	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	0.1	-0.4	0.8	0.5	0.1	0.7	-0.3	-0.3	0.0
15	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping	0.0	0.0	0.0	-0.3	-0.3	-0.3	1.5	1.5	1.5
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.3	0.2	0.4	0.2	0.2	0.3	0.4	0.4	0.5
	Higher Crop Prices	0.0	0.0	0.4	0.1	0.0	0.2	0.0	0.0	0.0
	Net Change	0.3	0.2	0.8	-0.1	-0.1	0.2	1.9	1.9	1.9
Total – All Subregions		**0.0**	**-0.6**	**1.7**	**-0.3**	**-0.7**	**0.4**	**2.0**	**2.0**	**2.2**

Source: CH2M Hill 2000, Table 19.

CUMULATIVE IMPACTS

Overall, the cumulative impacts of renewing long-term contracts can be either beneficial or potentially adverse to agricultural resources. In the long-term, the renewal of long-term water service and repayment contracts is beneficial in light of past projects that have assisted growers in bringing marginal lands into irrigation and production, including the statutory authorities for long-term contract renewals listed at the start of Chapter 1.[1]

[1] Renewal of these contracts is being undertaken in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), as amended and supplemented, including, but not limited to the Acts of August 26, 1937 (50 Stat. 844) as amended and supplemented, August 4, 1939 (53 Stat. 1187) as amended and supplemented, July 2, 1956 (70 Stat. 483); June 3, 1960 (74 Stat. 156); June 21, 1963 (77 Stat. 68); October 12, 1982 (96 Stat. 1262); and October 27, 1986 (100 Stat. 3050); and Title XXXIV of the CVPIA of October 30, 1992 (106 Stat. 4706).

Continued provision of water to agricultural and M&I users in the DMC Unit beneficially supports the ongoing production of food, fiber, and other agricultural resources that sustain the regional, subregional, and local economies.

In contrast, some aspects of long-term contract renewal may have adverse short-term effects on the agricultural viability of some areas. In particular, increased water prices resulting from a tiered pricing structure under some subregions and water-year scenarios, when combined with reduced south-of-Delta water supply reliability resulting from a combination of CVP operational constraints on deliveries to the DMC Unit (as discussed in Chapter 1), could result in difficult choices regarding the affordability of agricultural production as an enterprise. However, to adequately place the effect of tiered pricing aspects of long-term contract renewals in perspective, one must also consider other factors that may arguably have equal or more bearing on the affordability of agricultural production. In particular, the direction of continued agricultural subsidy and price support programs for selected crops, weather patterns, and market prices for agricultural products affect such decisions. As stated in the introduction to this section, changes in the cost or availability of production inputs also play a large part in a producer's ability to remain viable. Land, labor, seed, machinery, fertilizers, and water are all important, interrelated components in determining production decisions and enterprise profitability.

SECTION 3.3: SOCIOECONOMICS AND POWER RESOURCES

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the socioeconomic resources of the DMC Unit. Methods of analysis are described below.

AFFECTED ENVIRONMENT

Socioeconomic analyses are composed of two primary types of analyses. Regional economics looks at changes to the income and employment levels of the project area. Social analyses look at changes to the demographic or social makeup and well-being of the project area.

Renewal of the long-term water service contracts could potentially affect the following economic and social resources:

- Regional income
- Regional employment
- Regional population
- Area demographics

The project area includes the geographic service areas of the 20 CVP water contractors within the DMC Unit, as described previously in Section 3.1. The contractor service areas all run roughly along the Interstate 5/California Aqueduct corridor from the City of Tracy in San Joaquin County in the north, through parts of Stanislaus and Merced Counties, to the northern portion of Fresno County, just south of Highway 180 to the south.

When the economic modeling for this analysis was conducted, income and employment information by county was available from the U.S. Department of Commerce, Bureau of Economic Analysis website by industry for 1998. In terms of both earnings (as measured by wages and proprietor earnings) and employment, the largest industries in San Joaquin, Stanislaus, Merced, and Fresno Counties were retail trade, manufacturing, and government. Total earnings by major industry for each of the four counties are shown in Table 3.3-1. Total employment by major industry for each of the four counties is shown in Table 3.3-2.

Table 3.3-1
1998 Total Earnings by Industry by County[1]
(thousands of dollars)

Industry	County			
	San Joaquin	Stanislaus	Merced	Fresno
Farm Income[2]	$327,146	$351,101	$317,439	$554,061
Ag. Services, Forestry & Fishing	143,300	–[3]	90,821	581,149
Mining	12,578	–[3]	888	14,431
Construction	482,184	382,571	95,963	668,436
Manufacturing	975,178	1,099,685	383,958	1,006,513
Transportation & Public Utilities	655,342	341,005	134,501	651,665
Wholesale Trade	389,369	272,639	71,671	616,834
Retail Trade	757,576	625,731	227,704	1,067,575
Finance, Insurance & Real Estate	473,146	239,403	79,922	702,235
Services	1,556,828	1,313,887	357,590	2,578,764
Government	1,393,704	950,288	418,045	2,203,822
Total	**$7,166,351**	**$5,715,861**	**$2,178,502**	**$10,645,485**

Source: U.S. Department of Commerce 1998a.
[1]Includes wages, other labor income, and proprietor income.
[2]Farm income consists of proprietors' income; the cash wages, pay-in-kind, and other labor income of hired farm workers; and the salaries of officers of corporate farms.
[3]Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the total.

Table 3.3-2
1998 Total Employment by Industry by County[1]

Industry	County			
	San Joaquin	Stanislaus	Merced	Fresno
Farm Employment	17,097	14,591	12,086	34,620
Ag. Services, Forestry & Fishing	9,019	–[2]	4,798	41,266
Mining	231	–[2]	52	456
Construction	12,457	11,482	3,074	19,202
Manufacturing	24,259	27,870	13,012	28,847
Transportation & Public Utilities	14,399	7,150	3,597	15,633
Wholesale Trade	10,124	7,400	2,162	16,654
Retail Trade	40,824	36,143	13,439	60,941
Finance, Insurance & Real Estate	16,800	10,748	4,161	25,906
Services	63,495	51,209	15,353	98,520
Government	34,714	24,152	12,506	56,770
Total	**243,689**	**201,613**	**84,240**	**398,815**

Source: U.S. Department of Commerce 1998b.
[1]Includes full-time labor, part-time labor, and proprietor employment.
[2]Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the total.

Agriculture is also a very important industry. If taken together, the farm and agricultural service sectors are particularly important to Fresno and Merced Counties. Agriculture takes on additional significance because it is generally considered a "primary" industry (along with mining and manufacturing). A reasonably large portion of activity in non-primary industries can be attributed to support for primary industry activity in an area. Changes in primary industry activity, therefore, usually precipitate additional changes in non-primary, or support, industries.

Population data can be most closely related to the project area by aggregating individual census tract information. Population and ethnicity breakdowns were available by census tract for 1990, the most recent reported census supporting economic modeling. The California Department of Finance develops population and ethnicity estimates and projections at the county level. Implied growth rates from the California Department of Finance's county estimates were applied to the 1990 tract information to generate estimates and projections from 1990 through 2026 for the aggregated tracts. The following census tracts were used to simulate the DMC Unit's service area.

Fresno County:	Tracts 39, 82, 84.01, 84.02
Merced County:	Tracts 20, 21.98
Stanislaus County:	Tracts 32, 33.98, 34.98, 35
San Joaquin County:	Tracts 52.02, 52.03, 52.04, 52.05, 53.02, 53.03, 53.05, 53.06, 54.02, 55

Table 3.3-3 shows the estimated and projected population and ethnicity in the DMC Unit service area. As shown in Table 3.3-3, the Hispanic community makes up a large proportion of the regional population. It is estimated that over 40 percent of the regional population is identified as Hispanic in 2001 and that the percentage will rise to over 50 percent by 2026.

In addition to the information provided above, regional income, employment, and population can be impacted by changes to the availability, cost, or profitability of agricultural resources, recreational resources, power resources, and M&I water resources. Agricultural and recreational resources are discussed in their own sections within this chapter and the reader is referred to those sections for a review of the affected environment of those resources.

Table 3.3-3
Population and Ethnicity–Delta-Mendota Canal Unit Project Area[1]

Year	Population				
	White	Black	Other	Hispanic[2]	Total[3]
1990	69,542	2,257	21,885	35,995	93,684
1995	72,173	2,504	28,136	42,177	102,777
2000	75,774	2,802	33,601	48,500	112,883
2005	80,395	3,142	41,109	56,592	125,813
2010	85,226	3,531	47,514	65,062	139,339
2015	89,462	3,992	53,488	73,896	152,634
2020	93,940	4,417	60,688	85,069	167,985
2026	97,300	4,863	68,221	97,246	184,078

Source: U.S. Census Bureau 1990.
[1]Estimated and extrapolated from aggregated census tract data.
[2]Hispanic population is also counted as White, Black, or Other.
[3]Equals the sum of White, Black, and Other.

ENVIRONMENTAL CONSEQUENCES

This section describes the environmental impacts of the action alternatives as compared to the No-Action Alternative. Impacts are identified by comparing program components of each action alternative to the No-Action Alternative. The project alternatives are described more fully in Chapter 2.

NO-ACTION ALTERNATIVE

The No-Action Alternative provides a base condition for comparing the action alternatives and represents future conditions at a projected level of development without implementation of either action alternative. The No-Action Alternative reflects the conditions that are expected to be present upon implementation of the Preferred Alternative from the CVPIA PEIS.

Under No-Action Alternative conditions, population and ethnicity projections are equal to the 2026 projections shown in Table 3.3-3. It is assumed that relative income and employment levels would not differ substantially from existing conditions, if adjusted for inflation. Agricultural and recreational resources under No-Action Alternative conditions are described in their respective sections.

It is expected that the CVP will continue to provide an important power resource to municipalities and utility districts in the DMC Unit project area. M&I water deliveries would continue to be provided from the CVP. Under average water conditions under the No-Action Alternative, the model simulation indicated that 704,000 acre-feet of water is expected to be supplied to M&I users in the San Joaquin River region (CH2M Hill 2000,

Table 22). This water includes surface water under water rights (such as used in portions of the cities of Modesto and Stockton) and CVP and SWP water (such as used in portions of the city of Tracy and in Kern County). This value does not include groundwater used by the municipalities. Under dry year conditions, the model simulation indicated that the overall available water from these sources would be reduced to 656,000 acre-feet of M&I water (CH2M Hill 2000, Table 22). The reduction is due only to changes in CVP and SWP water availability because the model assumed that full amounts of surface water rights would be delivered in all water year types.

ALTERNATIVE 1

Alternative 1 involves a tiered pricing program that is based on the full current contract amount of water. Socioeconomic resource use resulting from this alternative is assumed to be similar to the No-Action Alternative because, as described in Table 2-1, the amount of water delivered, the timing of those deliveries, and the rates and method of payment for water delivered under Alternative 1 would not substantially differ from the No-Action Alternative.

ALTERNATIVE 2

Alternative 2 involves the application of a tiered pricing structure that is based on a rolling five-year average of actual water deliveries, rather than the current contract amount of water. A more thorough description of the tiered pricing structure used is found in the description of Alternative 2 in Section 3.2, Agriculture. As noted in Section 3.2, the tiered pricing structure and the No-Action Alternative rates against which it is compared are used because current law requires the adoption of tiered pricing structures.

A regional economic analysis for four different regions was developed in the April 24, 2000 Technical Memorandum (CH2M Hill 2000), which is included as Appendix A. The region used for this assessment is the San Joaquin River region. The DMC Unit is included within the San Joaquin River region. Impacts to this region may overstate the impacts to the DMC Unit service area because the region encompasses a geographic area that includes, but is larger than, the DMC Unit service area.

The regional economic analysis identifies long-term direct and indirect income and employment impacts that would be expected to result from the implementation of Alternative 2. Direct impacts result from changes in agricultural production and profitability and from changes in the cost of M&I water. Had there been any changes in the cost or delivery of CVP power or impacts to recreational resources, such impacts would also have been direct. Indirect impacts are those impacts to the regional economy

that occur to other economic sectors (e.g., trade, services, manufacturing) because of the direct impacts.

As noted above, there would be no impacts to recreational resources or power resources because CVP facilities are required to be operated in the same manner, no matter how much agricultural or M&I water is actually diverted for use. Reservoir levels will be similar and conveyance facilities will continue to have similar water flows. This would allow recreational resources to continue to be used at similar levels. It also would allow CVP hydroelectric facilities to operate at the same level, maintaining the same production and price levels that would be seen under the CVPIA PEIS Preferred Alternative (No-Action Alternative conditions).

The M&I water use economics analysis developed in the April 24, 2000 Technical Memorandum (CH2M Hill 2000) assumes that M&I users can afford the calculated water costs that are described in the CVPIA PEIS. Therefore, CVP water deliveries do not change for the M&I analysis. Additional costs for M&I water are incurred, however. In an average water year, additional costs of $5.2 million are incurred under Alternative 2 (in the entire San Joaquin River region). In a dry water year, no additional costs are incurred under Alternative 2.

Since the input-output model used in the regional economic analysis developed in the April 24, 2000 Technical Memorandum (CH2M Hill 2000) assumes that a long-run equilibrium is reached, it is only appropriate to compare Alternative 2 impacts to average No-Action Alternative conditions. In addition, the only hydrologic sequence that truly reflects long-run conditions is the five-year average followed by an average year. The five-year dry period followed by an average year is also examined because, while it is not strictly a long-run scenario, some regions can be permanently impacted by a five-year series of drought years. Because of this, the results can be considered long-term.

Under the average-average hydrologic sequence discussed in Section 3.2, Agriculture, total employment decreases by 120 jobs and income from profits and wages decreases by $4.2 million. Table 3.3-4 shows the direct and total (direct plus indirect) regional economic impacts to the San Joaquin River region under the average-average hydrologic sequence.

Under the dry-average hydrologic sequence, total employment decreases by 420 jobs and income from profits and wages decreases by $12.4 million. Table 3.3-5 shows the direct and total (direct plus indirect) regional economic impacts to the San Joaquin River region under the dry-average hydrologic sequence.

Table 3.3-4
Regional Economic Impacts on All Sectors for the Average-Average Hydrologic Sequence Compared to the No-Action Alternative Average Conditions–San Joaquin River Region

Impact Resulting From:	Employment (number of jobs)		Income[1] (millions of $)	
	Direct	Total	Direct	Total
Change in Agricultural Output	0	0	-$0.1	-$0.2
Change in Agricultural Net Income	20	40	$0.5	$1.0
Change in M&I Water Costs	-80	-150	-$206.0	-$5.1
Total[2]	**-60**	**-120**	**-$2.2**	**-$4.2**

Source: CH2M Hill 2000, Table 23.
[1]Includes income from wages and profits.
[2]May differ from sum of elements because of rounding.

Table 3.3-5
Regional Economic Impacts on All Sectors for the Dry-Average Hydrologic Sequence Compared to the No-Action Alternative Average Conditions–San Joaquin River Region

Impact Resulting From:	Employment (number of jobs)		Income[1] (millions of $)	
	Direct	Total	Direct	Total
Change in Agricultural Output	-10	-20	-$0.3	-$0.7
Change in Agricultural Net Income	-140	-240	-$3.0	-$6.5
Change in M&I Water Costs	-80	-150	$0.0	$0.0
Total[2]	**-230**	**-420**	**-$5.9**	**-$12.4**

Source: CH2M Hill 2000, Table 27.
[1]Includes income from wages and profits.
[2]May differ from sum of elements because of rounding.

Population impacts can be expected to occur as a result of the implementation of Alternative 2. The key drivers in determining changes in population are birth rates, death rates, and employment. Alternative 2 will not precipitate any changes in birth or death rates, but as shown in Tables 3.3-4 and 3.3-5, employment impacts will occur.

If we assume the same ratio of employment to population is present at the county level and within the San Joaquin River region, we can estimate expected changes in population. Using the same data source that was used for Table 3.3-1 (U.S. Department of Commerce, 1998a), the 1998 population for the area encompassing San Joaquin, Stanislaus, Merced, and Fresno Counties is 1,928,868. From Table 3.3-2, total employment in 1998 can be calculated as 928,357 for the area encompassing all four counties. With this information, a population-to-employment ratio of 2.08 is calculated. If this ratio is applied to the total employment losses in Table 3.3-4, the expected impact is a loss of 250 persons (2.08×120). If this ratio is applied to the total employment losses in Table 3.3-5, the expected impact is a loss of 873 persons (2.08×420).

Impacts are presented for the San Joaquin River region as a whole. As with all impacts within a project area, the concentration of impacts to a smaller geographic area within the project area increases the relative impact, while a more uniform dispersion of impacts across the project area decreases the relative impact. While it is highly unlikely that all identified impacts would present themselves within a single water district or community, it is just as unlikely that a fully uniform dispersion of impacts across the entire project area would occur.

To the extent that income, employment, and population impacts are concentrated in a smaller geographic area, impacts to local tax bases and public services may also be exacerbated. While a lower population would lessen the strain on current public services (e.g., police and fire protection, schools, and health services) to meet the needs of their service area, the loss of income would cause a corresponding decrease in local tax revenues used to provide such public services.

More localized impacts than those identified in this analysis are almost certain to occur. However, it is also fair to say that localized impacts are already being felt in areas where the transfer of costs from areas that currently receive water at rates below the value of the water is shifted. Some of this shifting of impacts may, in fact, occur within the regional study area. While it is appropriate to analyze impacts at the regional level, it is also appropriate to recognize the potential for greater (both negative and positive) local impacts than are reflected in the analysis.

In addition, more localized employment impacts could also translate into a disproportionate impact on specific groups such as minority or rural populations. It is likely that impacts realized as a result of implementation of Alternative 2 would be greater than impacts realized as a result of implementation of Alternative 1.

CUMULATIVE IMPACTS

Overall, the cumulative impacts of renewing long-term contracts can be either beneficial or potentially adverse to socioeconomic resources. In the long-term, the renewal of long-term water service and repayment contracts is beneficial in light of past projects that have assisted growers in bringing marginal lands into irrigation and production, including the statutory authorities for long-term contract renewals listed at the start of Chapter 1.[1] Continued provision of water to agricultural and M&I users in the DMC Unit beneficially

[1] Renewal of these contracts is being undertaken in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), as amended and supplemented, including, but not limited to the Acts of August 26, 1937 (50 Stat. 844) as amended and supplemented, August 4, 1939 (53 Stat. 1187) as amended and supplemented, July 2, 1956 (70 Stat. 483); June 3, 1960 (74 Stat. 156); June 21, 1963 (77 Stat. 68); October 12, 1982 (96 Stat. 1262); and October 27, 1986 (100 Stat. 3050); and Title XXXIV of the CVPIA of October 30, 1992 (106 Stat. 4706).

supports the ongoing production of food, fiber, and other agricultural resources that sustain the regional, sub-regional, and local economies.

In contrast, some aspects of long-term contract renewal may have adverse short-term effects on the economic viability of some areas. In particular, increased water prices resulting from a tiered pricing structure under some subregions and water-year scenarios, when combined with reduced south-of-Delta water supply reliability resulting from a combination of CVP operational constraints on deliveries to the DMC Unit (as discussed in Chapter 1), could result in difficult choices regarding the affordability of agricultural production as an enterprise. However, to adequately place the effect of tiered pricing aspects of long-term contract renewals in perspective, one must also consider other factors that may arguably have equal or more bearing on the affordability of agricultural production. In particular, the direction of continued agricultural subsidy and price support programs for selected crops, weather patterns, and market prices for agricultural products affect such decisions. As stated in the introduction to this section, changes in the cost or availability of production inputs also play a large part in the ability of a producer to remain viable. Land, labor, seed, machinery, fertilizers, and water are all important, interrelated components in determining production decisions and enterprise profitability.

SECTION 3.4: LAND USE

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on land uses within the DMC Unit. Information in this section was summarized primarily from the final CVPIA PEIS (Reclamation and Service 1999), county general planning documents, CVP contractor water conservation plans, U.S. Bureau of the Census data on population, and information obtained in interviews with individual DMC Unit contractors.

AFFECTED ENVIRONMENT

Land use can be defined as the human use of land resources for various purposes including economic production, natural resources protection, recreation, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine allowable uses. Agricultural development and the conversion of natural habitat to agricultural uses began in the early to mid-1800s and intensified in the later 1800s as the railroads provided the means to transport agricultural produce to much larger markets. This section discusses lands in the project area at the county level and for the geographic service areas of the 20 contractors in the DMC Unit. A discussion of areas of Important Farmland is also included.

COUNTY LAND USES

As discussed previously, the DMC Unit contractors are located in the San Joaquin River Region. Land uses could be affected in portions of San Joaquin, Stanislaus, Merced, and Fresno Counties. The following discussion generally addresses lands located within these counties.

San Joaquin County

San Joaquin County encompasses approximately 1,440 square miles and includes the seven incorporated cities of Stockton, Tracy, Manteca, Escalon, Ripon, Lodi, and Lathrop. Stockton and Tracy are the largest cities in the county. The City of Tracy is the only CVP contractor in the DMC Unit that is a municipality and uses its CVP supply solely for M&I use.

Demographics

In 1990, it was estimated that more than 77 percent of the county's population resided within the seven incorporated cities, with the additional 23 percent residing within urban and rural unincorporated areas (San Joaquin County 1992a, 1992b, 1992c). The population in San Joaquin County is expected to increase from about 465,000 in 1990 to

about 750,000 by the year 2010 or to increase on average by about 14,000 persons per year (San Joaquin County 1992a, 1992b, 1992c). Year 2000 Census data reports a population of 563,598 persons in San Joaquin County (U.S. Bureau of Census 2000a). In 2004, the population of San Joaquin County was estimated to be 613,500 (California State Association of Counties 2004).

Land Use

According to the county's most recent General Plan, approximately 86 percent of the county's total acreage in 1990 was used for agriculture. The land uses in San Joaquin County are shown in Table 3.4-1.

Table 3.4-1
San Joaquin County Land Uses

Land Use	Acres	Percentage of County
Agriculture	788,896	86.47
Urban*	63,760	6.99
Other Land	49,332	5.41
Water	10,341	1.13
Total	**912,329**	**100.00**

Source: San Joaquin County General Plan (San Joaquin County 1992a, 1992b, 1992c)
* Includes residential, commercial and industrial

San Joaquin County contains large areas of highly productive soils. Agriculture and related activities have historically constituted a major portion of the county's economic base, and agriculture has been a mainstay of the county's economy. According to the 1997 Agricultural Census for San Joaquin County, there were 808,838 acres in farms; this represents an increase from 783,715 acres in 1992, but a decrease from the 823,729 acres in 1987. It is estimated that with projected population growth and continued urbanization in the county that the amount of agricultural land lost could increase from the 10 percent loss over the last 50 years to a 33 percent loss by the year 2040 (San Joaquin County 1992a).

Stanislaus County

Stanislaus County encompasses an area of approximately 1,500 square miles and includes the nine incorporated cities of Ceres, Hughson, Modesto, Newman, Oakdale, Patterson, Riverbank, Turlock, and Waterford. Modesto and Turlock are the largest cities in the county.

Demographics

In 1990, an estimated 74 percent of the population lived in incorporated areas, an increase from 65 percent in 1980 (Stanislaus County 1994). Based on U.S. Bureau of the Census data, the population in Stanislaus County increased by 39 percent in the 1980s from 265,900 to 370,522. This compared to the average increase statewide of 26 percent. Between 1980 and 1990, the population in Stanislaus County increased by 59 percent in incorporated cities, while the unincorporated areas saw an increase of only 3 percent. Since 1990, the county's population has continued to grow at an average annual rate of

3.5 percent, reaching a total population of 412,676 in 1994 (Stanislaus County 1994). Year 2000 Census data reports a population of 446,997 persons in Stanislaus County (U.S. Bureau of Census 2000b). In 2004, the population of Stanislaus County was estimated to be 481,600 (California State Association of Counties 2004).

Land Use

Stanislaus County has adopted a number of community plans for most of the unincorporated towns in the county. Community plans outline land uses and future growth patterns of the towns in the county and are used in conjunction with county general planning documents. For unincorporated areas not included in a community plan, land use designations generally include residential, commercial, industrial, agricultural, urban transition, and industrial transition. Over 95 percent of the area in the unincorporated county is zoned for agricultural use.

The incorporated cities in the county have adopted city general plans. Specific land use information is available from community and city general plans. General countywide land use information is not readily available in the Stanislaus County General Plan. However, the plan does state that urban development has spread over 48,000 acres, much of which was originally prime farmland in agricultural production. According to the 1997 Agricultural Census for Stanislaus County, there were 732,736 acres in farms; this represents a decrease from 759,649 acres in 1992 and a further decrease from 819,845 acres in 1987.

Merced County

Merced County encompasses approximately 2,020 square miles and includes the six incorporated cities of Atwater, Dos Palos, Gustine, Livingston, Los Banos, and Merced and 18 unincorporated communities. Merced is the largest incorporated city in the county.

Demographics

From 1980 to 1990, the population in Merced County grew by over 33 percent from 134,560 to 178,403. This is compared to the average increase statewide of 26 percent. The incorporated cities grew by approximately 41 percent and the unincorporated areas by 19 percent. Year 2000 Census data reports a population of 210,554 persons in Merced County (U.S. Bureau of Census 2000c). In 2004, the population of Merced County was estimated to be 225,100 (California State Association of Counties 2004).

Land Use

Merced County uses the “Urban Centered Concept” as a basic land use principle. This concept directs urban development in identified centers. Increased growth often results in

a loss of the most productive agricultural soils. Under this concept, however, urban development will only occur within cities, unincorporated communities, and other urban centers. The Urban Centered Concept was revised in 1990 to include the development of unincorporated communities in the foothills on both sides of the county. This revision has fostered the planned development of subdivisions that will presumably become the urban centers for new communities in the foothills of the county.[1] In Merced County, besides the urban areas discussed above, rural areas of the county, which are typically used for cropping or pasturing activities, are subject to their own land use designations. When the general plan was developed in 1990, it was estimated that 80 percent of the population lived in the urban centers, the remaining 20 percent lived in rural areas, and 95 percent of the land in the county was considered rural.

According to the 1997 Agricultural Census for Merced County, there were 881,696 acres in farms, a decrease from 1,049,302 acres ten years earlier.

Fresno County

Fresno County encompasses nearly 6,000 square miles and includes the 15 incorporated cities of Coalinga, Clovis, Firebaugh, Fowler, Fresno, Huron, Kerman, Kingsburg, Mendota, Orange Cove, Parlier, Reedley, San Joaquin, Sanger, and Selma. Over 60 percent of the population resides in the county's two largest cities, Fresno and Clovis.

Demographics

According to Department of Finance population estimates, the population in Fresno County grew between 1980 and 1990 by approximately 29 percent, from 514,621 to 661,400. This is compared to the average statewide increase of 26 percent. The combined populations of Fresno and neighboring Clovis comprise 61 percent of the total county population and 82 percent of the population of the other incorporated cities combined (County of Fresno 2000a). Year 2000 Census data reports a population of 799,407 persons in Fresno County (U.S. Bureau of Census 2000d). In 2004, the population of Fresno County was estimated to be 841,400 (California State Association of Counties 2004).

Land Use

In 1997, approximately 50 percent of the county's total acreage was used for agriculture. The current land uses in Fresno County are shown on Table 3.4-2.

[1] Pursuant to the Merced County General Plan, full environmental review is required for community specific plans for any such development that may, to the extent they are within the CVP permitted place of use, eventually rely on the CVP allocation to the agricultural water districts after the environmental review has been completed.

Farming and agriculture-related businesses comprise a major component of the local economy. Factors that contribute to its success include excellent soil and climatic growing conditions and workforce and transportation availability. According to the 1997 Agricultural Census for Fresno County, there were 1,881,418 acres in farms; this represents a decrease from 1,975,373 acres in 1987.

Table 3.4-2
Fresno County Land Uses
(1997)

Land Use	Square Miles
Residential	152
Commercial	7
Industrial	11
Agricultural	2,911
Resource Conservation[1]	2,691
Unclassified[2]	11
Incorporated Cities	154
Total	**5,937**

Source: Fresno County General Plan (County of Fresno 2000a, 2000b)
[1]Including national forests, parks and timber preserves
[2]Includes streets, highways and rivers

CVP CONTRACTORS

As discussed in Section 3.1, 20 contractors receive CVP water from the Delta-Mendota Canal. The following discussion provides information on land uses for each contractor as well as a discussion of current agriculture and future trends in agriculture as applicable. The figures included at the end of Section 3.1 display the current land use/land cover for those contractors discussed below.

Banta-Carbona Irrigation District

Banta-Carbona Irrigation District is entirely an agricultural district and currently does not supply any water for M&I use. It is anticipated that as the City of Tracy and the Interstate 5 corridor continue to grow, some areas currently within the district may be detached and annexed to the City of Tracy. Also, new areas that may require water for M&I purposes would be detached from the district. Currently, a few parcels within the district are targeted for detachment and would be annexed to the City of Tracy. Whenever a new urban expansion is planned, the land is automatically deleted from district boundaries. Banta-Carbona Irrigation District has informed Reclamation of its plan to transfer a portion of its CVP supply to the City of Tracy by 2025. Therefore, while vulnerable to development pressures along the Interstate 5 corridor, Banta-Carbona Irrigation District is expected to remain an entirely agricultural district.

The district was considered built-out in 1968, following the completion of an underground pipeline made possible with funds from a PL 84-984 federal assistance loan. All of those facilities have been used for district deliveries. However, as the City of Tracy continued to expand, some of these facilities have been modified or moved to continue serving the agricultural lands remaining in the district; water service through some of the newest

alignments has not yet begun. When an area is detached from the district, the water that was used to serve the land remains with the district.

Major crops being produced within the district include both row crops (cannery tomatoes, dry beans, alfalfa, and a small quantity of melons) and permanent crops (primarily almonds, with smaller amounts of walnuts, apricots, peaches, and apples). Also, some areas have been planted with grapes over the last few years. Irrigation methods include furrow, open ditch or border flooding, siphon pipe on row crops, and sprinklers on permanent crops. Historically, small areas of the district have remained fallow during the growing season.

Broadview Water District

Most of the farmers in the Broadview District lease the land from absentee landowners. Broadview Water District is almost entirely an agricultural district. The only CVP water used for M&I use is 23 acre-feet, which is used as the drinking water source in the district. The drinking water serves both Broadview Water District buildings and a small number of residents. Because Broadview Water District is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely.

Cropping patterns in the district have remained stable. The entire district is planted in row crops with approximately one-half of the district producing cotton. Other crops include seed alfalfa, tomatoes, and melons. There are no permanent crops in the district because of shallow groundwater levels. Irrigation methods include primarily furrow and gated pipe, with a smaller number of acres on sprinklers. Historically, areas of the district have remained fallow during the growing season.

Centinella Water District

The Centinella Water District, an entirely agricultural district, is 840 acres in size and has only one landowner. All CVP water is used for agricultural uses. Because Centinella Water District is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely. While Del Puerto Water District provides the administrative functions for the district, Centinella Water District has its own CVP contract.

City of Tracy

All CVP water received by the City of Tracy is used for M&I purposes. As urban growth continues both in Tracy and along the Interstate 5 corridor, urbanization would likely continue to expand into neighboring water districts. It is expected that some lands located in neighboring The West Side Irrigation District, Plain View Water District, and Banta-

Carbona Irrigation District may detach from their respective districts and be annexed to the City of Tracy. Once annexed, the City of Tracy will be responsible for fulfilling all water supply needs. To meet its growing water demands, the City of Tracy is actively pursuing additional surface water supplies in the form of permanent water transfers. The West Side Irrigation District is currently working with the City of Tracy to permanently transfer 5,000 acre-feet (2,500 acre-feet initially, with another 2,500 acre-feet in five years) of CVP supply for M&I use to help meet the city's growing demand. In addition, the South County Water Supply Program is expected to supply 10,000 acre-feet of treated surface water supply to the City of Tracy (South County Water 2004). Construction of facilities necessary to provide the supplemental supply is currently under way and is scheduled to be completed by the summer of 2005. The Banta-Carbona and West Side Irrigation Districts have also informed Reclamation of their plans to transfer a portion of their CVP supplies to the City of Tracy by 2025.

A large portion of the development in Tracy will be residential in nature; however, an increase in industrial and commercial development is also anticipated. Fueling the growth in the area is low land prices, expansion out of the San Francisco Bay Area, and freeway access.

Coehlo Family Trust

The portion of the Coehlo Family Trust property under contract with Reclamation for the delivery of CVP water is 1,120 acres in size. Row crops grown on the property include primarily cotton, with smaller quantities of wheat, garlic, and cannery tomatoes. Permanent crops include table grapes.

The Coehlo Family Trust property is located in the area of the Interstate 5 Business Development Corridor. This corridor is a rural partnership for Central California commerce and is formed by a coalition of the cities of Firebaugh, Mendota, Kerman, and San Joaquin and the unincorporated community of Tranquillity, in western Fresno County. The group has a goal of working as a cooperative association to attract business and industrial development and new jobs to the area. The area is currently experiencing small amounts of growth; however, this growth is not expected to affect the Coehlo Family Trust property operations in the short term. Growth in this portion of Fresno County is considered minor compared to the major growth pressures experienced along Interstate 5 near the cities of Patterson and Tracy.

Del Puerto Water District

Del Puerto Water District is primarily an agricultural district. There are about 170 water users in the district. Currently, the only CVP supply used for M&I purposes is the 1 acre-

foot of water supplied to the city landfill each month for dust suppression. All remaining CVP supplies are used for agriculture. Despite the urban sprawl in the area resulting from the growth of Patterson and Tracy and along the Interstate 5 corridor, Del Puerto Water District would like to continue to remain primarily an agricultural district. The district does not intend to increase the amount of CVP water used for M&I purposes.

More than 30 different crops have been grown commercially in the district over the years. Principal crops grown include row crops (cannery tomatoes, alfalfa, large limas, and dry beans). However, almost one-half of the agricultural production in the district is permanent crops (almonds, apricots, and walnuts). Typical irrigation methods in the district include primarily furrow irrigation for row crops and sprinkler, sprinkler with less frequent use of drip, and micro-misters for permanent crops. Historically, areas of the district have remained fallow during the growing season.

Eagle Field Water District

Eagle Field Water District is entirely an agricultural district. Because it is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely. The crops produced in the district include cotton, cannery tomatoes, and rice. In the past, some of the land has also been farmed with sugar beets and dry onions.

Fresno Slough Water District

Fresno Slough Water District is entirely an agricultural district and does not supply water for M&I use. It is also located in the area of the Interstate 5 Business Development Corridor, nearest to the town of Tranquillity. While the area is currently experiencing small amounts of growth, this growth is not expected to affect the district's ability to remain entirely an agricultural district.

There are about 10 landowners in the district. Most of these landowners have farmed in the district for a number of years, contributing to its stable landowner base. Crops grown in the district are predominantly row crops (cotton, seed alfalfa, and sugar beets). There are few, if any permanent crops in the district and no major land conversions to permanent crops are anticipated. The main reason for the reliance on row crops rather than permanent crops is that soils are typically heavy clays and suitable only for row crops. Irrigation methods in the district include mostly furrow irrigation and a few solid-set sprinklers. Historically, small areas of the district have remained fallow during the growing season.

James Irrigation District

James Irrigation District is entirely an agricultural district and currently does not supply any water for M&I use. The district is also located in the area of the Interstate 5 Business Development Corridor and nearest to the city of San Joaquin in Fresno County. While the area is currently experiencing small amounts of growth, this growth is not expected to affect James Irrigation District's ability to remain entirely an agricultural district.

There are approximately 200 farms in James Irrigation District and about 23,233 acres of the 26,103-acre district were irrigated in 1996. The principal crops grown in the district include cotton and seed alfalfa with smaller amounts of alfalfa hay and tomatoes. Also, a small parcel of land (less than 500 acres) produces barley and wheat in rotation. Soil types in the areas of row crops include heavy Merced clay. Soil types in small areas of the district include light sandy loam soil types; these areas are planted with permanent crops (almonds and grapes). The trend in the district has been a gradual shift from larger farms to smaller family-owned farms. The typical irrigation method in the district is furrow irrigation. Drip irrigation was used for grapes. Historically, areas of the district have remained fallow during the growing season.

Laguna Water District

Laguna Water District is entirely an agricultural district with only one landowner. Because it is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely. Primary crops produced in the district include alfalfa hay, cotton, oats, sugar beets, and wheat. All the land in the district is irrigable agriculture.

Tranquillity Public Utilities District

The Tranquillity Public Utilities District includes approximately 32 farmable acres located adjacent to Fresno Slough. A portion of the property is occupied by the wastewater treatment plant. The balance is used for agriculture and is located in the area of the Interstate 5 Business Development Corridor. The nearby area is currently experiencing small amounts of growth; however, this growth is not expected to affect the Tranquillity Public Utilities District property operations in the short term.

Mercy Springs Water District

Mercy Springs Water District is entirely an agricultural district. Because it is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely. The crops typically produced in the district include cotton and alfalfa. All administrative functions for the district are currently being provided by Panoche Water District. Also, most of the district has been acquired by the Panoche

Drainage District for use as a regional drainage management facility on which subsurface drain water is applied to salt-tolerant crops. The CVP contract supply for this area has been assigned to other CVP districts. Administrative functions for Mercy Springs Water District are performed by Panoche Water District.

Oro Loma Water District

Oro Loma Water District is entirely an agricultural district with only one landowner. Because it is located in a rural area away from major development pressures, the conversion from agricultural to M&I uses is unlikely. The crops typically produced in the district include rice, and historically, some of the land has also been farmed with cotton.

Patterson Irrigation District

Patterson Irrigation District is entirely an agricultural district. The district provides no M&I water. It is anticipated that as Patterson and the Interstate 5 corridor continue to grow, any new proposed development requiring M&I water would be detached from the district. Patterson Irrigation District policy requires water users requesting M&I water to detach from the district. Therefore, despite neighboring growth pressures, Patterson Irrigation District is expected to remain entirely an agricultural district.

In the last 15 years, the primary crops have included apricots, beans, and alfalfa. Because the district is located in the heart of dairy country, crops like alfalfa will continue to be staple crops. However, there is a continued conversion from these row crops to higher valued permanent crops (almonds). Patterson Irrigation District does not currently maintain detailed records regarding irrigation methods. The best estimates show that the main irrigation methods used between 1986 and 1996 were primarily furrow/border followed by sprinklers and trickle irrigation.

Plain View Water District

Plain View Water District is primarily an agricultural district. In 1990, a portion of the district's CVP supply was allocated for M&I use to service commercial and residential development. The water provided by the district was treated and delivered by the City of Tracy. The district also intends to continue to provide M&I water to increasing urban development within its boundaries. This water will also be treated and delivered by the City of Tracy. Alternatively, the district may decide to assign a portion of its CVP water supply to the City of Tracy. Since 1990, approximately 500 acres of land have been converted to M&I use. The water allocated for the converted land will continue to serve the new land use through the City of Tracy water supply system. It is possible that as Tracy continues to grow, the amount of CVP water used for M&I purposes could increase.

It is also possible that the growth could result in some areas currently within the district being detached and annexed to the City of Tracy.

Row crops produced within the district include primarily alfalfa. Permanent crops include almond and cherries. There is also some dry farming in the district. Typical irrigation methods include primarily furrow and border irrigation and sprinklers.

Reclamation District #1606

Reclamation District #1606 has only one lessee and is entirely an agricultural district. Historically, only a small area of the district has been farmed and all remaining lands remained fallow. On those acres being farmed, cotton is the only crop produced. The other portions of the district are typically used for dry grazing.

Reclamation District #1606 is adjacent to James Irrigation District and near the city of San Joaquin. While the area is currently experiencing small amounts of growth, this growth is not expected to affect Reclamation District #1606's ability to remain entirely an agricultural district.

The West Side Irrigation District

The West Side Irrigation District is divided in half by the City of Tracy and, therefore, is directly impacted by the city's continuing growth. Currently, the district is an agricultural district and does not provide any water for M&I use. The district would prefer to continue to be solely an agricultural district. The City of Tracy has recently considered annexing approximately 1,400 acres of the district. It is possible that as the City of Tracy continues to grow, additional acres could be detached from the district. The district has held discussions with the City of Tracy to permanently transfer 5,000 acre-feet of CVP supply to meet Tracy's growing demand. This transfer would allow the district to continue to be strictly an agricultural district.

There are about 100 water users within the district. The main crops typically produced in the district include alfalfa for hay, cannery tomatoes, and beans. Although there are two small parcels of permanent crops (apricots and walnuts) within the district, the soil in the district is substandard for growing permanent crops and further conversion to permanent crops is not anticipated. Major irrigation types include furrow and border (flood) irrigation. The use of sprinkler irrigation in the district is difficult because of high winds. This year, no historically farmed land is fallow.

Tranquillity Irrigation District

Tranquillity Irrigation District is an agricultural district and currently does not supply water for M&I use. It is also located in the area of the Interstate 5 Business Development Corridor, nearest to the town of Tranquillity. While the area is currently experiencing small amounts of growth, this growth is not expected to affect the district's ability to remain entirely an agricultural district.

Principal crops grown in the district include cotton, seed alfalfa, canning tomatoes, sugar beets, and melons. Over the past few years, about 50 acres of land have been converted from row crops to permanent crops (almonds). The almond trees are still young (at two to three years old); however, it is expected that if they are successful, more land will be converted from row crops to more profitable permanent crops. The district has also experimented with growing small areas of innovative crop types including mustard, bell peppers, and zinnias for seed. It is estimated that 9,270 of the 10,750 acres in the district are irrigated. Typical irrigation for the row crops includes furrow irrigation. Drip systems were also installed for those acres converted to permanent crops. Tranquillity Irrigation District has approximately 100 landowners.

West Stanislaus Irrigation District

West Stanislaus Irrigation District is entirely an agricultural district and currently provides no water for M&I use. Although some land within the district is zoned for industrial use, there are currently no known development plans. It is also the district's policy to remain solely an agricultural district and it requires that any M&I users detach from the district.

Primary crops in the district include row crops (cannery tomatoes, beans, and alfalfa). The district has also continued to see a conversion from row crops to more profitable permanent crops including almonds and grapes. This trend is expected to continue. A portion of the district land is also being used for dairy farms. The typical irrigation methods in the district are furrow irrigation for row crops and drip irrigation or sprinklers for permanent crops. Gated pipe is also used extensively throughout the district for both furrow and border irrigation.

Widren Water District

Widren Water District is approximately 30 acres in size and is entirely an agricultural district with only one landowner. Because it is located in a rural area away from major development pressures, the conversion from agriculture to M&I is unlikely. Crops typically produced in the district include seed alfalfa and sugar beets.

FARMLAND CATEGORIES

Table 3.4-3 contains a description of farmland categories as defined by the U.S. Department of Agriculture, Natural Resources Conservation Service. Some of these farmland categories are found within San Joaquin, Stanislaus, Merced, and Fresno Counties.

Table 3.4-3
Important Farmland Map Categories

Category	Description
Prime Farmland	Land that has the best combination of physical and chemical characteristics for producing food, seed, forage, fiber, and oilseed crops and is also available for use. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods.
Farmland of Statewide Importance	Land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production. The land must have been used for production of irrigated crops within the last three years and also meet specific criteria including soil temperature and range.
Unique Farmland	Land that does not meet the criteria for either Prime Farmland or Farmland of Statewide Importance, but that is used for the production of specific high economic value crops. It is land that has a special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality of high yield of specific crops.
Farmland of Local Importance	Land that may be important to the local economy because of its productivity.

Source: County of Fresno 2000b.

Prime farmland continues to decline across the counties encompassing the contract service areas. Table 3.4-4 summarizes important farmland trends for Fresno, Merced, San Joaquin, and Stanislaus Counties.

REGULATORY SETTING

Williamson Act

The California Land Conservation Act of 1965 (more commonly known as the Williamson Act) established a voluntary tax incentive program for preserving both agricultural and open space lands. The Act reduces property taxes in return for the guarantee that the property will remain in agriculture for not less than 10 years, thereby slowing down the conversion of agricultural land. Under the Act, property owners enter into 10-year contracts with their respective counties. The county then places restrictions on the land in exchange for tax savings. The property is then taxed according to the income it is capable

Table 3.4-4
Important Farmland Changes from 2000 to 2002

Type of Farmland	Fresno County		Merced County		San Joaquin County		Stanislaus County	
	2000	2002	2000	2002	2000	2002	2000	2002
Prime Farmland	734,052	731,149	287,160	286,054	419,227	415,527	264,121	260,730
Farmland of Statewide Importance	491,569	490,353	157,936	158,405	93,739	92,521	30,715	30,069
Unique Farmland	104,223	102,946	96,355	100,749	59,118	61,849	59,850	61,205
Farmland of Local Importance	70,691	74,347	47,621	41,772	58,906	56,507	31,848	29,519
Important Farmland Subtotal	1,400,535	1,398795	589,072	586,980	630,990	626,404	386,534	381,523

Source: California Department of Conservation 2004; Division of Land Resource Protection, Farmland Mapping and Monitoring Program 2004.

of generating from agriculture and other compatible uses, rather than being taxed on its full market value. The contract is automatically renewed annually after the first 10 years, unless a written request, called a Notice of Non-Renewal, is prepared.

The California Department of Conservation, Division of Land Resources Protection maintains information by county on acres of land currently enrolled in the Williamson Act. Table 3.4-5 summarizes acreage of farmland enrolled in the Williamson Act for Fresno, Merced, San Joaquin, and Stanislaus Counties.

Table 3.4-5
Williamson Act: Total Reported Enrollment in 2000 and 2001

Type of Farmland	Fresno County		Merced County		San Joaquin County		Stanislaus County	
	2000	2001	2000	2001	2000	2001	2000	2001
Prime	1,084,968	1,080,671	--*	215,249	343,153	338,757	281,910	284,764
Nonprime	487,012	487,075	--*	122,907	151,703	148,213	405,484	404,869

Source: California Department of Conservation 2004
*Merced County began its participation in the Williamson Act in 2000; therefore, the number of acres in 2000 was unavailable.

ENVIRONMENTAL CONSEQUENCES

The renewal of the long-term contracts could potentially affect the following:

- Agricultural lands going out of production and remaining fallow, including some Prime or Unique Farmlands.

- Agricultural lands being converted to M&I use.

ACTIONS NOT EVALUATED IN THIS EA

The authorities and laws governing the renewal of the DMC Unit long-term water service contracts allow no discretionary control over private land-use activities. The renewal of long-term water service contracts being analyzed in this document, therefore, does not include any actions on private land.

Actions outside the renewal of current water service contracts between Reclamation and the DMC Unit contractors are also not analyzed. In addition, Reclamation's action does not include any discretionary actions relating to land-use questions. Changes in land use will be determined by the actions of individual water users as a result of multiple factors, including many that are unrelated to the federal action of this contract renewal.

For example, the implementation of long-term water service contract renewals would not directly affect land uses or result in any land use changes within the DMC Unit. It would not require the construction of new facilities that would alter current land uses and would not result in the installation of any structures that would conflict with current land use plans. The construction of facilities and the installation of structures associated with the operation and maintenance of the DMC Unit facilities are separate actions, subject to compliance with federal law and separate environmental review.

LAND FALLOWING

As discussed above under Affected Environment, some previously farmed land in the project area may remain fallow during a particular growing season. It can be assumed that some of this land also meets the Important Farmland criteria listed in Table 3.4-3. The specific districts that have fallowed land and the amounts and locations of the fallowed land vary during each growing season. Among the several reasons that land may be fallowed are:

- Water deliveries, reliability, and timing and their relation to pre-planting and management decisions and costs.

- Water availability.

- Water rights being transferred from one parcel of land to another.
- Economics, including cost controls, commodity pricing and market conditions.
- Foreclosures.
- Marginal agricultural land or poor soil conditions.
- Growth pressures (discussed below).

M&I, COMMERCIAL, AND RESIDENTIAL DEVELOPMENT

The long-term water service contract renewals would also not directly or indirectly cause land use to change from irrigation to M&I uses. Land use changes could occur regardless of the renewal, in part, because only cities and counties have land use jurisdiction. The irrigation or water districts or other agricultural districts have no land use jurisdiction, and thus they cannot control such changes within their boundaries. Moreover, the renewals are only for the maximum quantity available to each contractor under its current long-term water service contract. Therefore, there would be no substantive change from the supply provided under these contracts. It is important to emphasize that ongoing and future development pressures in the DMC Unit will continue to rely on CVP water.

The provision of continued CVP water service pursuant to the renewal of long-term water service contracts and authorized use of water for irrigation or M&I purposes means that M&I development may occur at some level and that some CVP contract water supply could be converted from agricultural to M&I use. This type of analysis, however, is "fact-specific," and the outcome depends in large part on the availability of alternative water supplies and reasonably foreseeable events that are outside of the scope of this EA.

The San Joaquin River Region is experiencing unprecedented growth and considerable development pressures. The Central Valley has become a magnet for those in search of affordable housing within a commuting distance of major employment centers. Specifically, for San Joaquin and Stanislaus Counties, this growth is primarily a result of people who move from the San Francisco Bay Area in a search for affordable housing costs and a highly attractive quality of life. Increased demand for residential property, combined with low prices for agricultural products and rising costs of farming, has created increased pressure for farmers to sell their land for housing developments. As the population increases and development pressures continue, it is expected that a corresponding increase in urban development and a decrease in agricultural lands in production would also continue.

Many of the DMC Unit contractors could be directly affected by the increasing growth pressures (specifically, those contractors located in San Joaquin and Stanislaus Counties and near the cities of Tracy and Patterson). While it is the policy of most of these districts to remain entirely agricultural districts, this could require an area currently within the district to detach from the district if M&I water is required for development. In the case of some districts, the amount of CVP water used for M&I purposes could increase.

The factors that could limit the potential for growth include the lack of water and areas that cannot be developed. Increased development pressures may result in increased pressures for additional M&I supply. In some areas, current water restrictions could result in little or no room for growth. Overall, to accommodate growth, other options for water supply would need to be considered, including water transfers and exchanges or additional groundwater pumping, if that is a feasible water supply option in the area.

INDIRECT IMPACTS/INTERRELATED ACTIVITIES

As a result of the federal action evaluated in this EA, DMC Unit contractors would continue to receive CVP water supplies in quantities that do not exceed their current contract amounts and that provide for continued agricultural or M&I use in their service areas. To the extent that such uses depend upon CVP supplies to continue, such continued uses are an indirect effect of contract renewal or are an interrelated activity. Much or all of the lands in the DMC Unit that can be cultivated are cultivated, and therefore continuation of the supply of water or even the addition of water would simply be used on lands currently under production. Thus, contract renewal would not result in increasing the level of agricultural activity within the DMC Unit above the current baseline.

In terms of indirect impacts, continued delivery of CVP water in the DMC Unit will likely support current trends towards M&I development in only specific, limited areas. The respective percentage and distribution of M&I and agricultural activities in the project area will be subject to a wide range of economic factors, local land use decisions, and other factors outside of Reclamation's control.

Depending on the effects of other contract provisions, such as increased prices for water, or related federal actions causing increased shortages of available CVP supplies, the amount of CVP water used by irrigation and M&I users may decrease as a result of the renewed contracts. Such indirect effects cannot be determined or quantified.

NO-ACTION ALTERNATIVE

As described in Chapter 2, the No-Action Alternative provides a baseline condition for comparing the action alternatives and represents future conditions at a projected level of

development without the implementation of any action alternative. Under the No-Action Alternative, long-term contracts would be renewed and contractors would still receive their CVP allocation.

The No-Action Alternative would not directly impact land uses within the project area. The renewal of long-term contracts in the DMC Unit would not involve construction of new facilities that would alter current land uses and would not result in the installation of structures that would conflict with current land use plans.

The long-term renewal of CVP water to the project area would only continue to provide water supplies that accommodate a portion of the planned populations and land uses that have been identified in the county general planning documents. The renewal of the long-term contracts would beneficially continue the water supply for agricultural production and crop production and, therefore, contribute to the continued production of these lands. Implementation of this alternative would not directly impact the continued production of agricultural crops or impair the productivity of important farmlands.

An indirect impact could occur as more land is fallowed when surface water supplies are unavailable or when deliveries are reduced in response to higher water costs under tiered pricing. Also, alternative surface water and groundwater supplies may become unaffordable because of the factors listed above. It is, however, difficult to attribute a corresponding loss of acreage to the affordability of water because of the wide range of factors that drive land use decisions.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not directly result in any adverse impacts to land use. The long-term renewal of CVP water to the project area would only continue to provide water supplies that accommodate a portion of the planned populations and land uses that have been identified in the county general planning documents. The renewal of the long-term contracts would continue the water supply for agricultural production and crop production and, therefore, contribute to the continued production of these lands. Implementation of this alternative would not directly impact the continued production of agricultural crops or impair the productivity of important farmlands.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not directly result in any adverse impacts to land use. The long-term renewal of CVP water to the project area would only continue to provide water supplies that accommodate a portion

of the planned populations and land uses that have been identified in the county general planning documents. The renewal of the long-term contracts would continue the water supply for agricultural production and crop production and, therefore, contribute to the continued production of these lands. Implementation of this alternative would not directly impact the continued production of agricultural crops or impair the productivity of important farmlands.

CUMULATIVE IMPACTS

Some of the DMC Unit contractors that are primarily agricultural could be affected by increasing growth pressures as California's population and economy continue to expand and to locate in the San Joaquin Valley. Most likely to be affected are those contractors located in San Joaquin and Stanislaus Counties and along the portion of the Interstate 5 corridor near the cities of Tracy and Patterson (i.e., Banta-Carbona Irrigation District, Del Puerto Water District, Patterson Irrigation District, Plain View Water District, The West Side Irrigation District, and, to a lesser extent, West Stanislaus Irrigation District).

Contractors in the I-5 Business Development Corridor, such as Tranquillity Irrigation District, James Irrigation District, Reclamation District #1606, the Coehlo Family Trust, and Tranquillity Public Utilities District, could also be affected, although the growth pressure is far less evident in that area. It is the present policy of most of these districts to remain entirely agricultural districts and to require that an area currently within the district to detach from the district if the land is to be converted from irrigated land to an M&I purpose of use. The only exception is the Plain View Water District, which has overlapping boundaries in some instances with the City of Tracy and has entered into arrangements for the City of Tracy to treat and deliver some of the district's M&I water to areas within the district's boundaries. Because the City of Tracy is already an M&I-only contractor, continued CVP service under its renewal contract would not cause a change.

In summary, any conversions from agricultural to M&I land use within the DMC Unit would not be caused by the terms of the renewal contract, nor by actions of the contractors that have no land use planning jurisdiction. Instead, such changes will result from land use planning decisions made by individual landowners. Some guidance as to the likely effect of future development in the area is found in the conservation policies of the agencies with land use planning jurisdictions. For example, the open space policies set forth in the City of Tracy General Plan and the opportunities for participation in the San Joaquin County Multi-Species Habitat Conservation Plan indicate that parties converting land to M&I uses in the area that is under the greatest development pressure will only be able to do so after an appropriate assessment of and mitigation for environmental impacts.

In order to evaluate how a change from an agricultural land use to an M&I land use could affect the environment, it is necessary to know both the current use of the parcel of land and the species associated with that parcel or area. The location of the converted land and the nature of the proposed M&I use are also highly relevant factors. Such information cannot be identified until specific changes have been proposed as part of the environmental review of the specific projects.

SECTION 3.5: AIR QUALITY

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the air quality in the area of the DMC Unit. Information in this section was summarized from the Draft CVPIA PEIS, Air Quality, Technical Appendix, Volume 6 (Reclamation 1997e) and has been updated as appropriate for more recent changes in air quality standards.

AFFECTED ENVIRONMENT

Most of the air pollutants in the area of the DMC Unit are associated with both urban and agricultural land uses. In general, there are four basic land uses: irrigated agriculture; dryland agriculture (dry cropped, fallow, idle, or grazed land); M&I; and undeveloped (natural). The primary air pollutants include particulate matter (PM) and hydrocarbons or organic gases that may serve as ozone (O_3) precursors.

Pollutants commonly associated with agricultural land uses include particulate matter, carbon monoxide (CO), nitrogen oxides (NO_x), and ozone precursors. Particulate matter results from field burning, farm operations such as tilling, plowing, and the operation of farm equipment on loose earth, and entrained road dust releases and fuels combustion in vehicles and farm equipment. Particulate emissions may also occur when fallowed fields do not have a crop cover to inhibit wind erosion. Carbon monoxide is released to the atmosphere during field burning and fuel combustion in farm equipment. Nitrous oxides are also released during field burning. Ozone precursors are released in farm equipment emissions and during the application of pesticides and fertilizers. The effect of these practices on air quality conditions may be influenced by meteorological conditions, the variability of emissions controls, and the adoption and enforcement of emissions regulations.

Many M&I practices result in hydrocarbon and particulate matter emissions. Sources of hydrocarbon emissions include fuel combustion in vehicles and industrial equipment, painting and solvent use, and residential heating. Sources of particulate matter emissions include dust entrained in pavement, structural and automobile fires, construction and demolition, residential fuel combustion, and fuel consumption in vehicles. CVPIA actions are not anticipated to affect air pollutants associated with relatively minor urban and industrial uses in the DMC Unit. Therefore, this section focuses on potential impacts to air quality conditions that would result from changes in agricultural land uses.

The DMC Unit is located in the San Joaquin Valley Air Basin (SJVAB), which includes the southern portion of the Central Valley, including the lower slopes of the mountain

ranges. The air quality of the SJVAB is regulated by the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), which has jurisdiction over Merced, Fresno, San Joaquin, and Stanislaus Counties. The entire SJVAB is designated nonattainment[1] with respect to federal and state ozone and particulate matter standards, and the urban area of Fresno is nonattainment for federal and state carbon monoxide standards.

ENVIRONMENTAL CONSEQUENCES

Air quality impacts that could occur are judged to be adverse if the action being evaluated causes or contributes to a violation of federal or state ambient air quality standards; increases exposure of people to air pollution in concentrations in violation of ambient standards; causes pollutant or pollutant precursor emissions in excess of local air quality management agency impact adverse thresholds; or violates federal, state, or local emission limitations for specific pollutants or emission sources. Current federal and SJVUAPCD regulations require that the project alternatives not have an adverse impact on regional air quality, as reflected by the estimated long- and short-term impacts from the direct and indirect emissions sources created by the action. The SJVUAPCD recommends the following thresholds for adverse air quality impacts:

- Reactive organic gases and NO_x should not exceed 10 tons per year.
- Complying with SJVUAPCD Regulation VIII reduces potential impacts from particulate matter emissions to less than adverse. Large or high intensity construction projects near sensitive receptors may require mitigation beyond Regulation VIII.
- The project causes or contributes to an exceedance of federal and state ambient carbon monoxide standards, as determined by screening or modeling.
- The adverse threshold for hazardous air pollutant emissions is based on the potential to increase cancer risk for the person with maximum exposure potential by 10 in one million. The non-cancer Hazard Index must be less than 1. This is to be determined by screening or modeling.
- The adverse threshold for odor impacts is based on distance of the odor source from people and complaint records for the facility or a similar facility. More than one confirmed complaint per year averaged over a three-year period or three

[1] The Clean Air Act and Amendments of 1990 define a "nonattainment area" as a locality where air pollution levels persistently exceed National Ambient air Quality Standards or that contributes to ambient air quality in a nearby area that fails to meet standards.

unconfirmed complaints per year averaged over a three-year period would be an adverse impact.

- Construction impacts have the same thresholds as above, but adverse thresholds apply only during the construction period.

NO-ACTION ALTERNATIVE

In the No-Action Alternative, agricultural land uses would include similar crops and cropping patterns as those described in the Affected Environment. It is assumed that retired or fallowed lands would be reseeded with grasses and grazed by livestock or occasionally dryland-farmed.

Very little change would be seen in either irrigated acreage from average to wet to dry water years. Actively farmed lands and fallowed lands can serve as a source of fugitive air emissions, particulate emissions, and minimal emissions from farm equipment engines. Fugitive dust emissions from irrigated lands are not substantially different from dry-farmed lands or fallow lands with a non-cultivated cover crop (Montgomery Watson 1995). Furthermore, emissions from farm equipment and transportation of agricultural materials would not substantially increase under the No-Action Alternative. Therefore, the No-Action Alternative would not result in adverse impacts to air quality.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in adverse impacts to air quality. Agricultural land uses would include similar crops and cropping patterns as those described in the Affected Environment. It is assumed that retired or fallowed lands would naturally revegetate, be grazed by livestock, or be occasionally dryland-farmed. Therefore, Alternative 1 would not result in adverse impacts to air quality.

ALTERNATIVE 2

As described in Table 3.2-6, 1,600 total acres could be taken out of production as a result of implementing Alternative 2 under average-wet or wet-wet hydrologic sequences, as compared to No-Action Alternative wet year conditions. This would be a short-term impact because, in the long run, hydrology would reflect average levels and long-term land fallowing could be considerably lesser in extent. The only long-term impact would be the impact resulting from comparing the total acres that could be taken out of production from implementation of Alternative 2 under the average-average hydrologic sequences, as compared to No-Action Alternative average year conditions. As described in Table 3.2-6, a total of 600 acres could be taken out of production as a result of implementing

Alternative 2 under average-average hydrologic sequences, as compared to No-Action Alternative average year conditions.

Fugitive dust could be generated from these 600 acres until native plants and grasses provide natural cover for land taken out of production. As with all impacts within the study area, the concentration of impacts to a smaller geographic area within the study area increases the relative impact, while a more uniform dispersion of impacts across the study area decreases the relative impact. It is unlikely that the amount of fugitive dust generated would constitute an adverse impact of any measurable level when considered in the context of an air basin-wide impact. To the extent that land taken out of production is concentrated in a smaller geographic area, impacts could be larger to the area directly adjacent to barren lands. In addition, fugitive dust emissions from irrigated lands are not substantially different from dry-farmed lands or fallow lands with a non-cultivated cover crop (Montgomery Watson 1995).

CUMULATIVE IMPACTS

Cumulative impacts to air quality are not expected to result from the combined effect of long-term contract renewals and past, present, and reasonably foreseeable future actions related to air quality. Growth and development decisions that indirectly affect air quality by increasing the number of vehicles and their emissions will be made independently at the local land use planning decision-making level, as discussed in Section 3.4, Land Use. The California Air Resources Board continues to pursue additional incentives to reduce air pollution from agricultural sources, including the incentives in Assembly Bill 923 recently signed by Governor Schwarzenegger. Additional California Air Resources Board programs include, but are not limited to the development of the 2004 San Joaquin Valley Ozone State Implementation Plan, which identifies the clean air strategies needed to bring the valley into attainment with the federal 1-hour ozone standard by 2010, and the implementation of Senate Bill 656 enacted in 2003, which requires the board, in consultation with air districts, to develop and adopt a list of the most readily available, feasible, and cost-effective control measures that could be employed by the board and the air districts to reduce inhalable particulate matter (PM_{10}) and the subset of fine particles ($PM_{2.5}$). The goal is to make progress toward attainment of state and federal PM_{10} and $PM_{2.5}$ standards. The proposed control measures are to be based on rules, regulations, and programs existing in California as of January 1, 2004, to reduce emissions from new, modified, or existing stationary, area, and mobile sources. As a second step, the bill requires the board and air districts to adopt implementation schedules for control measures no later than July 31, 2005. By their nature, these reasonably foreseeable future actions being pursued at different stages of implementation by the California Air Resources Board are designed to address ongoing air quality issues in the project study area.

SECTION 3.6: SOILS AND GEOLOGY

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the soils and geology within the DMC Unit. Information in this section was summarized from the Draft CVPIA PEIS, Soils and Geology, Technical Appendix, Volume 2 (Reclamation 1997b).

AFFECTED ENVIRONMENT

This section describes the soils and geologic conditions found within the project area, which is located in the San Joaquin Valley and includes portions of San Joaquin, Stanislaus, Merced, and Fresno Counties as well as the geographic service areas of the 20 DMC Unit contractors.

SOILS

The soils of the San Joaquin Valley are divided into four physiographic groups: valley land soils, valley basin soils, terrace soils, and upland soils. Valley land and valley basin land soils comprise most of the San Joaquin Valley floor. In the vicinity of the Delta-Mendota Canal, valley land soils consist of deep alluvial and aeolian soils that make up some of the best agricultural land in California. Valley basin lands consist of organic soils of the delta, poorly drained soils, and saline and alkali soils in the valley trough and on the basin rims.

The San Joaquin Valley experiences drainage and soil salinity problems. Drainage problems are a result of irrigated agriculture in an area with shallow groundwater tables and little or no drainage outlet. In a large part of the valley, on the west side, shallow groundwater tables, salts imported by water deliveries, and accumulation of natural salts in soil and groundwater from irrigation threaten sustained agriculture.

Backlund and Hoppes (1984) estimated that about 2.4 million of the 7.5 million acres of irrigated cropland in the Central Valley have been affected by salt. These saline soils generally exist in the valley trough and along the eastern and western edges on both sides of the San Joaquin Valley. By the year 2000, it was projected that up to 918,000 acres of farmland in the San Joaquin Valley would be affected by high water tables less than five feet from the ground surface (San Joaquin Valley Drainage Program 1990). In addition to drainage, problems have occurred with the accumulation of toxic metals (arsenic, boron, molybdenum, and selenium) that have leached from natural deposits through the application of irrigation water.

Selenium in the soil is primarily a concern on the west side of the San Joaquin Valley. When the soils in this area are irrigated, selenium, other salts, and trace elements dissolve and leach into the groundwater (Gilliom et al. 1989). Over the past 30 to 40 years of irrigation, most soluble selenium has been leached from the soils into the shallow groundwater. It is drained from those soils when growers try to protect crop roots from salts and the high water table.

In areas with high selenium concentrations, selenium leached from the soils enters irrigation return flows and subsurface drainage flows. Irrigation of these soils further mobilizes selenium, facilitating its movement into shallow groundwater that is retained in poorly drained or mechanically drained soils. In the absence of adequate drainage facilities, leaching cannot fully remove the salts from these soils because water cannot percolate beyond one or more confining clay layers under the shallow groundwater aquifer.

GEOLOGY

The San Joaquin Valley is part of a large, northwest-to-southeast-trending asymmetric trough of the Central Valley, which has been filled with up to six vertical miles of sediment. This sediment includes both marine and continental deposits ranging in age from Jurassic to Holocene. The San Joaquin Valley lies between the Coast Ranges on the west, the Sierra Nevada on the east, and extends northwestward from the San Emigdo and Tehachapi Mountains to the Delta near the City of Stockton. The San Joaquin Valley is 250 miles long and 50 to 60 miles wide. The relatively flat alluvial floor is interrupted occasionally by low hills.

The San Joaquin Valley floor is divided into several geomorphic land types including dissected uplands, low alluvial fans and plains, river floodplains and channels, and overflow lands and lake bottoms. The alluvial plains cover most of the valley floor and comprise some of the most intensely developed agricultural lands in the San Joaquin Valley. In general, alluvial sediments of the western and southern parts of the San Joaquin Valley tend to have lower permeability than eastside deposits.

Near the valley trough, fluvial deposits of the east and west sides grade into fine-grained deposits. The San Joaquin Valley has several thick lakebed deposits. The deposit that most notably affects groundwater and confinement is the Corcoran Clay Member, deposited about 600,000 years ago. This clay bed, which is found in the western and southern portions of the valley, separates the upper semi-confined to unconfined aquifer from the lower confined aquifer (Page 1986). The clay bed covers approximately 5,000 square miles and is up to 160 feet thick beneath the present bed of Tulare Lake.

Subsidence occurs in the western San Joaquin Valley as a result of reduced groundwater elevations and the related compaction of the soil interstitial spaces that had previously been filled with groundwater. Land subsidence has caused substantial reductions in ground elevations in some locations.

ENVIRONMENTAL CONSEQUENCES

Implementation of the project alternatives would result in adverse geologic impacts if it increased the likelihood of or resulted in exposure to earthquake damage, slope failure, foundation instability, land subsidence, or other severe geologic hazards. It would be considered an adverse impact if it caused severe erosion or sedimentation or resulted in the loss of the use of soil for agriculture or habitat, loss of aesthetic value associated with a unique landform, or loss of mineral resources.

NO-ACTION ALTERNATIVE

Groundwater levels may decline 1 to 3 percent because of the allocation of CVP water to Level 2 refuge water supplies and improved fish and wildlife habitat. As a result of increased groundwater pumping, land subsidence could increase over its present rate.

Groundwater pumping and land subsidence will continue in the project area as they have historically. However, to the extent that CVP deliveries are curtailed in some years, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping could increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, local groundwater levels could decline with no or little recharge and land subsidence could increase over present rates. Soils may increase in salinity because salts may concentrate from an insufficient surface water supply for adequate leaching or because of poor quality, pumped groundwater.

ALTERNATIVE 1

Alternative 1 could have impacts similar to those discussed above for the No-Action Alternative. Groundwater pumping and land subsidence will continue in the project area as they have historically. However, to the extent that CVP deliveries are curtailed in some years, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels

could decline with no or little recharge and land subsidence could increase over present rates. Soils may increase in salinity as salts concentrate as a result of an insufficient surface water supply for adequate leaching or poor quality, pumped groundwater.

ALTERNATIVE 2

Alternative 2 could have impacts similar to those discussed above for the No-Action Alternative. Groundwater pumping and land subsidence will continue in the project area as they have historically. However, to the extent that deliveries of CVP surface water are reduced, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge and land subsidence could increase over present rates. Soils may increase in salinity as salts concentrate as a result of an insufficient surface water supply for adequate leaching or poor quality, pumped groundwater.

CUMULATIVE IMPACTS

Long-term contract renewals, when considered in combination with other past, present, and reasonably foreseeable future actions, will not likely result in cumulative impacts to soils and geologic resources. Some DMC Unit soils may be subject to growth and development pressures that indirectly lead to the conversion of their current uses to commercial, residential, or industrial use. However, these decisions are made at the individual and local levels, and are difficult to estimate because of the speculative nature of the real estate market and locations where such pressures may arise, the ability of local jurisdictions to enforce best management practices encouraging wind and water erosion control, and the localized effectiveness of such practices. Long-term contract renewals continue the delivery of water to predominantly irrigated lands in the DMC Unit. Deliveries support the continued beneficial impacts of current farming practices that encourage erosion control from an economic standpoint. Erosion control measures practiced by DMC Unit farmers conserve topsoil that is rich in nutrients and water-holding capacity—qualities that are expensive to replace—thereby maintaining the agricultural quality of potentially affected soil resources.

SECTION 3.7: GROUNDWATER

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the groundwater resources within the DMC Unit. Information in this section was summarized from the Draft CVPIA PEIS, Groundwater, Technical Appendix, Volume 2 (Reclamation 1997b).

AFFECTED ENVIRONMENT

The southern two-thirds of the Central Valley regional aquifer system, which covers over 13,500 square miles and extends from just south of the Delta to just south of Bakersfield, is referred to as the San Joaquin Valley Basin (DWR 1975). Much of the western portion of this area is underlain by the Corcoran Clay Member, which divides the groundwater system into two major aquifers: a confined aquifer below the clay and a semi-confined aquifer above the clay (Williamson et al. 1989). Aquifer recharge to the semi-confined upper aquifer historically occurred from stream seepage, deep percolation of rainfall, and subsurface inflow along basin boundaries. With the introduction of irrigated agriculture into the region, recharge was augmented with deep percolation of applied agricultural water and seepage from the distribution systems. Recharge of the lower confined aquifer results from the subsurface inflow from the valley floor and foothill areas to the east of the eastern boundary of the Corcoran Clay Member.

Groundwater in the San Joaquin Valley has been heavily developed by pumping, largely for crop irrigation. Pumping has caused depressions to form as a result of subsidence and has altered regional groundwater flow patterns, recharge, and discharge. Annual groundwater pumping in the San Joaquin River region may often exceed estimates of perennial yield. All the subbasins within the San Joaquin River region have experienced some overdraft (CDWR 1994).

Land subsidence in the San Joaquin Valley has occurred mostly in areas that are confined by the Corcoran Clay, where pressure changes caused by groundwater pumping promote greater compressive stress than in the unconfined zone (CDWR 1977). The maximum land subsidence levels recorded in the Central Valley occurred within Fresno County. Land subsidence levels of as great as 30 feet have been measured in parts of northwestern Fresno County (Ireland et al. 1982).

As a result of land subsidence, increased pumping lifts, and water quality limitations, surface water was imported to the western valley to decrease groundwater pumping. Beginning in 1967, surface water imported via the California Aqueduct began to replace groundwater as the primary source of irrigation supply in the area south of the city of

Mendota. The availability of surface water led to an increase in the total quantity of water applied, whereas the quantity of water removed from the system by the wells decreased. The marked decrease in groundwater pumping has allowed a recovery in hydraulic head. The rise in the potentiometric surface from 1967 to 1984 was nearly one-half of the drawdown that occurred from predevelopment conditions to 1967.[1] Agricultural development also has affected the semi-confined zone. Increased rates of recharge resulting from percolation of irrigation water, combined with the rapid post-1967 decrease in pumping, caused a rise in the height of the water table over much of the western valley (Belitz and Heimes 1990).

Vertical groundwater flow is substantial in the western San Joaquin Valley. The combined result of pumping from below the Corcoran Clay and percolation of irrigation water from above the water table has been the development of a large downward flow gradient in the semi-confined aquifer and a groundwater flow divide in the western part of the valley (Belitz and Moore 1990).

GROUNDWATER QUALITY

Groundwater quality conditions in the San Joaquin River Region vary throughout the area. Total dissolved solids, boron, nitrates, arsenic, selenium, and dibromo-chloropropane are parameters of concern for agricultural and M&I uses in the San Joaquin River region. Of particular concern on the west side of the San Joaquin Valley are total dissolved solids and selenium.

Groundwater zones commonly used along a portion of the western margin of the San Joaquin Valley have high concentrations of total dissolved solids, ranging from 500 milligrams per liter (mg/L) to greater than 2,000 mg/L (Bertoldi et al. 1991). The concentrations in excess of 2,000 mg/L commonly occur above the Corcoran Clay layer. These high levels have impaired groundwater for irrigation and M&I uses in the western portion of the San Joaquin Valley. Contractors within the DMC Unit that have drainage-impacted lands have developed aggressive programs to manage salts in the root zone and to minimize deep percolation through the use of high-efficiency irrigation techniques, such as sprinklers, shortened rows, and installation of groundwater monitoring wells.

High selenium concentrations in soils of the west side of the San Joaquin River region are of considerable concern because of their potential to leach from the soil by subsurface irrigation return flow into the groundwater and into receiving surface waters (Bertoldi et al.

[1] The potentiometric surface is defined as the level that water from the confined aquifer would rise to in a tightly cased well completed in the confined aquifer.

1991). Selenium concentrations in shallow groundwater along the west side of the region have been highest in the central and southern area south of the cities of Los Banos and Mendota, with median concentrations of 10,000 to 11,000 mg/L (Bertoldi et al. 1991).

AGRICULTURAL SUBSURFACE DRAINAGE

Inadequate drainage and accumulating salts have been persistent problems along the west side and in parts of the east side of the San Joaquin River region for more than a century. The most extensive drainage problems exist on the west side of the San Joaquin River and Tulare Lake regions. The soils on the west side of the region are derived from marine sediments and are high in salts and trace elements. Irrigation of these soils has mobilized these compounds and facilitated their movement into the shallow groundwater. Much of this irrigation has been with imported water containing salts, resulting in rising groundwater and increasing soil salinity. Where agricultural drains have been installed to control rising water tables, drainage water frequently contains high concentrations of salts and trace elements (San Joaquin Valley Drainage Program 1990).

In some portions of the San Joaquin River region, natural drainage conditions are inadequate to remove the deep percolation to the water table. This occurs because vertical conductivity is low and, therefore, limits downward drainage of infiltrated water. In addition, horizontal hydraulic conductivity is low and inhibits downslope subsurface drainage. Shallow groundwater levels often rise into the root zone, and subsurface drainage must be supplemented by constructed facilities for irrigation to be sustained (Reclamation and Service 1999).

ENVIRONMENTAL CONSEQUENCES

For purposes of this analysis, an adverse impact on the groundwater resources would occur if a long-term water service contract renewal:

- Results in the depletion of current groundwater resources
- Substantially alters the volume of groundwater available for beneficial use, or
- Causes groundwater now available for beneficial use to be unavailable because of contamination or physical obstruction

NO-ACTION ALTERNATIVE

Groundwater levels may decline 1 to 3 percent as a result of the allocation of CVP water to Level 2 refuge water supplies and improved fish and wildlife habitat. As a result, land subsidence could increase over its present rate.

Groundwater pumping and land subsidence will continue in the project area as they have historically. However, to the extent that reduced CVP surface water is delivered, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge and land subsidence could increase over present rates. In addition, salt loading in soils and shallow groundwater would occur as a result of the application of the lower-quality groundwater. Soil salinity and saline subsurface water tables are being managed to maintain agricultural productivity through a combination of best management practices and the operation of subsurface drainage collection systems. With the reduced CVP water supply projected in the No-Action Alternative, drainage would not be expected to increase.

ALTERNATIVE 1

Alternative 1 could have impacts similar to those discussed above for the No-Action Alternative. Groundwater pumping and land subsidence will continue in the project area as they have historically. To the extent that deliveries of CVP surface water are reduced, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge and land subsidence could increase over present rates. In addition, salt loading in soils and shallow groundwater would occur. These impacts would be the same as the impacts for the No-Action Alternative.

ALTERNATIVE 2

Alternative 2 could have impacts similar to, but perhaps more pronounced than those discussed above for the No-Action Alternative. Groundwater pumping and land subsidence will continue in the project area as they have historically. However, to the extent that less CVP surface water is purchased because tiered pricing starts at a lower percentage of contract deliveries, especially in one or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge and land subsidence could

increase over present rates. In addition, salt loading in soils and shallow groundwater would occur. These impacts would be the same as the impacts for the No-Action Alternative.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, could result in indirect impacts to groundwater resources by contributing to those factors that increase the reliance on groundwater pumping during those years when the price of surface water exceeds the costs of groundwater pumping. The extent and severity of these impacts will depend on many factors, including the availability and price of CVP water. First, the costs of pumping can increase as groundwater basins and aquifers are drawn down and can decrease as they recharge. Extensive drawdown of the aquifers can cause poorer quality from nearby zones to degrade the aquifers, but only if the pumping is so extensive as to remove hydrologic barriers to aquifer degradation. Extensive pumping can also exacerbate subsidence problems. The increased depth of pumping needed when aquifers are drawn down leads to increased lift/energy costs and, in some instances, can result in the need to resize pumps to access deeper groundwater. Similarly, the increased use of pumps resulting from a greater reliance on groundwater can accelerate pump equipment wear and tear and lead to earlier repair and replacement costs. These and related costs will need to be considered over the long-term and compared to the future annual prices of CVP water or water transfers to make the right economic decisions to pump or purchase surface water.

SECTION 3.8: SURFACE WATER RESOURCES

This section discusses the effects that the alternatives considered in Chapter 2 may have on surface water resources for the CVP contractors in the DMC Unit.

AFFECTED ENVIRONMENT

WATER RIGHTS

The DMC Unit is composed of two different types of water rights holders: (1) Exchange Contractors, who have a previous San Joaquin River water right that is now supplied by Reclamation and who are not subject to the Proposed Action, and (2) water service contractors, who have acquired water through the CVP and whose long-term contract renewals constitute the Proposed Action. The CVP has developed different reliability criteria for each type of contractor. Typically, Exchange Contractors have a more reliable water supply because of their pre-CVP water right.

WATER SUPPLY

Prior to the CVP, irrigators in the Central Valley depended primarily on groundwater for agricultural irrigation. As the groundwater quantity and quality declined and land subsidence increased, it became apparent that an additional source of water was needed for agriculture to continue. The CVP was implemented in part to supply irrigators, primarily in the Central Valley, with a more consistent water supply than the existing groundwater resources. Groundwater resources were previously discussed in Section 3.7.

CVP water is used for irrigation of agricultural areas, M&I uses, and more recently, to restore fisheries and aquatic habitat in the waterways that have been affected by water development. The largest use of CVP water is for agricultural irrigation. The greatest demand for irrigation water occurs in mid- to late summer, as crops mature and crop water use increases. During the winter, farmers also use water for frost control and pre-irrigation of fields to saturate the upper soil. This saturation process loosens the soil for plowing and provides adequate moisture for seed germination. Natural winter precipitation is usually insufficient for these pre-irrigation needs at the lower elevations typical of the DMC Unit.

Reclamation makes water from the CVP available to contractors for reasonable and beneficial uses, but this water is generally insufficient to meet all of the contractors' needs. In the DMC Unit service area, contractors without a sufficient CVP water supply may extract groundwater if pumping is feasible or negotiate water transfers with other contractors. Available alternate supplies from groundwater pumping, alternate surface water supplies, and/or transfers may also be accessed when CVP surface water deliveries

become more expensive than pumping or transfer costs. However, increased groundwater pumping can cause overdraft conditions and land subsidence. Shallow aquifers have been contaminated by years of irrigation in the valley. The application of pesticides and herbicides and the increased solubility of naturally occurring trace elements in the soil, including selenium, boron, and arsenic, contribute to groundwater contamination.

The CVPIA PEIS developed estimates of maximum water contract deliveries for the year 2026 (Reclamation and Service 1999). These estimates were based on previous use, existing contract amount, and appropriate general plan environmental documentation relevant to CVP water use. The estimates for the two types of contracts, depending on the type of service, include the following:

- **Agricultural Water Service Contracts:** The maximum annual use between 1980 and 1993 or the projected use as addressed in the appropriate environmental documentation, limited by the maximum contract amount.

- **Water Rights and Exchange Contractors:** The maximum annual use between 1980 and 1993 or projected use as addressed in relevant environmental documentation, limited by the maximum contract amount.

- **M&I Water Service Contracts:** Total demand based on 2020 demands in DWR Bulletin 160-93 (DWR 1994) or the current M&I shortage criteria. Since 1991, Reclamation has been attempting to develop an M&I shortage policy applicable to as many CVP contractors as possible. Current M&I shortage criteria are detailed in the CVP Draft M&I Water Shortage Policy (Reclamation 2001f).

WATER QUALITY

Surface water quality in the San Joaquin River Basin is affected by many factors, most notably, the upstream development of Friant Dam and dams on other tributaries, which withhold most of the natural flow of the river, except during flood conditions. Other factors affecting San Joaquin River surface water quality include natural runoff, agricultural return flows, biostimulation, construction, logging, grazing, operations of flow-regulating facilities, urbanization, and recreation. In addition, irrigated crops grown in the western portion of the San Joaquin Valley have accelerated the leaching of minerals from soils, altering water quality conditions in the San Joaquin River system.

In the western part of the San Joaquin Valley, soils are derived mainly from the marine sediments that make up the Coast Range and are high in salts and trace elements such as selenium, molybdenum, arsenic, and boron. As a result of extensive land development in the San Joaquin Valley, erosion and drainage patterns have been altered, thereby

accelerating the rate at which these trace elements have been dissolved from the soil to accumulate in groundwater, streams, and the San Joaquin River.

Water quality in the San Joaquin River varies considerably along the river's length. Above Millerton Lake and downstream toward the Mendota Pool, water quality is generally excellent. The reach from Gravelly Ford to the Mendota Pool (about 17 miles) is frequently dry except during flood control releases, because all water released from Millerton Lake is diverted upstream to satisfy water rights agreements or percolated to groundwater. During the irrigation season, most of the water released from the Mendota Pool to the San Joaquin River is imported from the Delta via the Delta-Mendota Canal and generally has a higher concentration of total dissolved solids than that of the water in the upper reaches of the San Joaquin River. Most of the water released from the Mendota Pool to the San Joaquin River is diverted at or above Sack Dam for agricultural uses. Between Sack Dam and the confluence with Salt Slough, the San Joaquin River is often dry. From Salt Slough to Fremont Ford, most of the flow in the river is derived from irrigation returns carried by Salt and Mud Sloughs. This reach typically has the poorest water quality of any reach of the river.

As the San Joaquin River progresses downstream from Fremont Ford, water quality generally improves at successive confluences, specifically at those with the Merced, Tuolumne, and Stanislaus Rivers. In the relatively long reach between the Merced and Tuolumne Rivers, however, mineral concentrations tend to increase as a result of agricultural drainage water, other wastewaters, and effluent groundwater (DWR 1965). Total dissolved solids in the San Joaquin River near Vernalis have historically ranged from 52 mg/L (at high stages) to 1,220 mg/L from 1951 to 1962 (DWR 1965). During the mid- to late 1960s, San Joaquin River water quality continued to decline. In 1972, the State Board included a provision in Decision 1422 that Reclamation maintain average monthly total dissolved solid concentrations in the San Joaquin River at Vernalis of 500 mg/L as a condition of the operating permit for New Melones Reservoir on the Stanislaus River. The State Board's Decision 1641 implementing the 1995 Bay-Delta Plan requires both the CVP and SWP to meet Delta water quality standards. The Regional Board has developed a proposed Basin Plan Amendment dealing with salinity and boron on the San Joaquin River that is pending before the State Board. In addition, extensive water quality monitoring and implementation of best management practices to address water quality is being implemented through the Regional Board's Irrigated Lands Conditional Waiver Program. The Westside San Joaquin River Watershed Coalition has obtained an approved waiver, with most contractors in the DMC Unit participating.

In drier years, CVP water quality and reliability decreases. First, the salinity and the concentration of organic materials from upstream soils and return flows increase in the

Delta in drier years because the flow volumes from the Sacramento and San Joaquin Rivers decrease and salt water intrudes further upstream in the Delta.

WATER DELIVERY CRITERIA

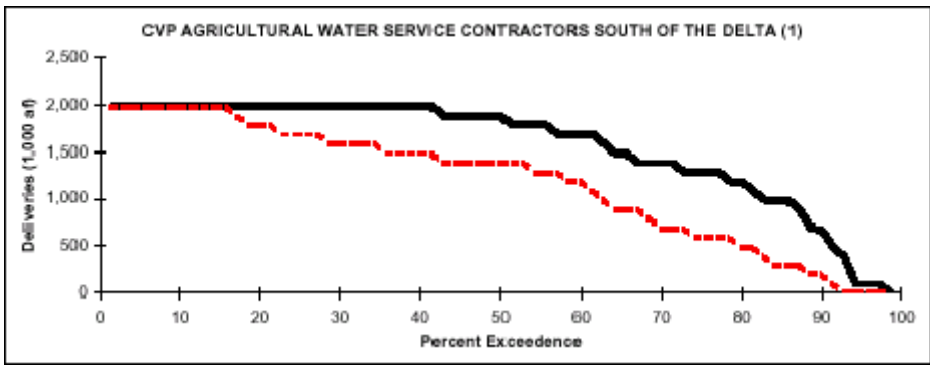
The amount of CVP water available each year for contractors is based on the storage of winter precipitation and control of spring runoff in the Sacramento and San Joaquin River basins. The schedule of CVP water conveyed to and diverted from the river is determined by state water right permits, judicial decisions, and state and federal obligations to maintain water quality, enhance environmental conditions, and prevent flooding. Water delivery criteria are shaped by these obligations to a larger degree than was realized in the CVPIA PEIS (Reclamation and Service 1999) and the impact that meeting these obligations has had on water deliveries is greater than was foreseen in the CVPIA PEIS (Reclamation and Service 1999). The allocation of CVP water to the contractors is determined by water service contracts and the capacity of project facilities to store and convey water.

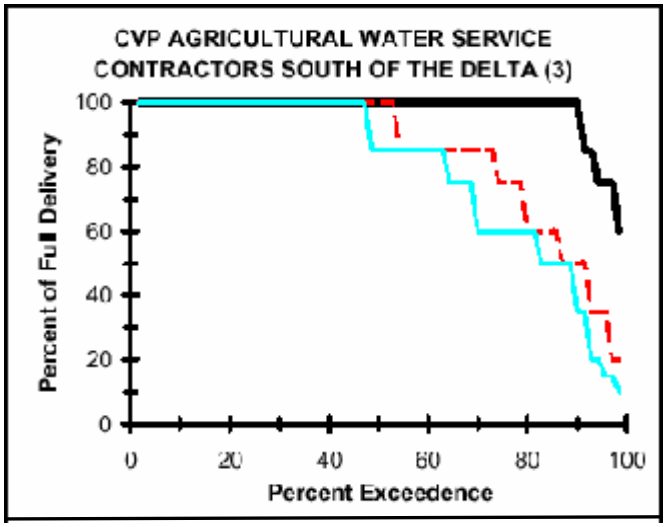
Conditions with CVPIA Implementation

With CVPIA implementation in accordance with the PEIS Preferred Alternative, in addition to conditions in the late 1990s, CVPIA PEIS modeling indicated that CVP agricultural water service contractors located south of the Delta would receive an average of 59 percent of current total contract amounts, based upon a hydrologic pattern that is similar to the previous 70 years of hydrology, as shown below in Figure 3.8-1 and described in Technical Appendix, Volume 2, of the Draft CVPIA PEIS (Reclamation 1997b). These conditions result in the delivery of total contract amounts to agricultural water service contractors located south of the Delta approximately 15 percent of the time. Minimum deliveries of zero would occur only in critically dry years. The 2004 Biological Assessment for the CVP OCAP (Reclamation 2004b) projects that under current operation of the EWA, agricultural contractors located south of the Delta would receive their total contracted amount approximately 50 percent of the time.

Under these conditions, PEIS modeling indicated that CVP M&I water service contractors will receive an average of 85.5 percent of existing total contract amounts, as shown in Figure 3.8-1. PEIS modeling estimated that total contract amounts would be delivered to M&I water service contractors located south of the Delta approximately 65 percent of the time. Minimum deliveries of 50 percent would occur only in critically dry years.

Figure 3.8-1
Percentages of Full Delivery;
CVP Agricultural and M&I Water Service Contractors South of the Delta





ENVIRONMENTAL CONSEQUENCES

NO-ACTION ALTERNATIVE

Water Supply

Under the CVPIA PEIS No-Action Alternative, average annual deliveries under the CVP were estimated at 5.7 million acre-feet per year, including deliveries to refuges, water rights holders, Sacramento River Settlement Contractors, Delta-Mendota Exchange Contractors, and CVP water service contractors. Total CVP water deliveries were estimated to decrease under most alternatives, including the Preferred Alternative, by approximately 10 percent as a result of the allocation of CVP water to Level 2 refuge water supplies, allocation of water to Section 306(b)(2) of the CVPIA, and reduced Trinity River exports to the Central Valley. These reduced delivery impacts were addressed fully in the CVPIA PEIS (Reclamation and Service 1999).

Recent modeling using the assumptions developed for the OCAP generated average annual total CVP deliveries that range from 4,748,000 acre-feet to 5,045,000 acre-feet, depending upon the environmental programs in place. The OCAP modeling assumes that CVP allocations to agriculture range from zero to 100 percent of the contracted deliveries, based on supplies reduced by Section 3406(b)(2) allocations. The modeling assumes that allocations to M&I contractors range from 50 to 100 percent of contracted deliveries, based on the same considerations applied to agriculture.

OCAP modeling estimates that average annual CVP water deliveries to south-of-Delta agricultural and M&I water service contractors would range from 1,225,000 acre-feet to 1,587,000 acre-feet, depending on the environmental programs in place. Table 3.8-1 indicates predicted average south-of-Delta water supply allocations under the six alternatives modeled in the OCAP.

Table 3.8-1
Long-Term Averages for the Six OCAP CALSIM II Studies
(1,000 acre-feet)

	D-1485 (1991)	D-1485 (1992)[1]	D-1485 (1993)[2]	D-1641 (1994)	D-1641 (1997)[3]	EWA (2004)[4]
CVP Total Deliveries	4,868	5,044	5,045	4,918	4,748	4,752
South of Delta – agriculture	1,454	1,374	1,375	1,260	1,102	1,110
South of Delta – exchange	851	851	851	847	847	847
South of Delta – M&I	133	131	131	128	123	124
South of Delta – refuge	132	280	280	280	280	280
South of Delta – total[5]	2,753	2,819	2,821	2,699	2,536	2,545

[1] D-1485 with Firm Refuge Level 2 (1992)
[2] D-1485 with Firm Level 2 and Winter-Run Biological Opinion (1993)
[3] D-1641 with CVPIA Section 3406(b)(2) (1997)
[4] CVPIA Section 3406(b)(2) with EWA (2004)
[5] Total includes canal losses due to evaporation

These modeling estimates illustrate the varying effects of D-1485, D-1641, and the EWA, when added to obligations for Refuge Level 2 deliveries, winter-run chinook salmon Biological Opinion flows, and CVPIA Section 3406(b)(2) allocations.

Water Quality

The No-Action Alternative would not result in any alteration to surface water quality. Continued operation of the system of pumps, canals, laterals, and related water conveyance and distribution facilities would not lead to further degradation in water quality.

ALTERNATIVE 1

Water Supply

Explanatory recitals and provisions in Alternative 1 differ from the No-Action Alternative by emphasizing increased water supply reliability through the completion of yield increase studies and the development of CVP operational criteria that would minimize delivery shortages. Although these recitals and provisions call for increased supply reliability, future reliability will actually depend on several interacting factors, including among other considerations, water year type, water transfer acquisitions, and the implementation of other water development projects. The action of renewing long-term water service contracts under Alternative 1 does not substantially differ from the No-Action Alternative with respect to the following:

- "Contract Total" definition
- Water to be made available and delivered to the contractor
- The time for delivery of water
- The point of diversion and responsibility for water distribution
- Water measurement
- Rates and methods of payment for water

Because there are no substantial differences between Alternative 1 and the No-Action Alternative, there would be no surface water supply impacts from the implementation of Alternative 1.

Water Quality

Alternative 1 would not result in any alteration to surface water quality because there would be essentially no increase in drainage discharges when compared to the No-Action Alternative. Continued operation of the system of pumps, canals, laterals, and related water conveyance and distribution facilities would not lead to degradation in water quality. Current trends affecting the surface water quality would continue.

ALTERNATIVE 2

Water Supply

The action of renewing long-term water service contracts under Alternative 2 does not substantially differ from the No-Action Alternative with respect to the following:

- "Contract Total" definition
- Water to be made available and delivered to the contractor
- The time for delivery of water
- The point of diversion and responsibility for water distribution
- Water measurement
- Rates and methods of payment for water

Because there are no substantial differences between Alternative 2 and the No-Action Alternative, there would be no surface water supply impacts from implementation of Alternative 2.

Water Quality

Alternative 2 would not result in any alteration to surface water quality as long as water deliveries remain the same and, thus, drainage also remains the same. Continued operation of the system of pumps, canals, laterals, and related water conveyance and distribution facilities would not lead to degradation in surface water quality and current trends affecting the surface water quality would continue.

CUMULATIVE EFFECTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, will not create any additional cumulative impacts on surface water resources or quality. Water deliveries to DMC Unit contractors will be but one of many competing demands on surface water resources available for diversion and delivery. Because south-of-Delta deliveries rely on several actions "upstream" of the DMC Unit study area, long-term contract renewals in the DMC Unit have limited opportunities to increase reliance on other south-of-Delta surface water resources.

SECTION 3.9: BIOLOGICAL RESOURCES

This section analyzes potential impacts to non-listed species and habitats with the potential to occur in the DMC Unit project area. To avoid redundancy and the potential for conflicts across documents, potential impacts to federal or state listed or federal candidate fish, plant, and wildlife species are addressed in separate documents, including the Delta-Mendota Canal Unit Biological Assessment (Reclamation 2003a).

The study area is located in the San Joaquin Valley and includes portions of San Joaquin, Stanislaus, Merced, and Fresno Counties and the service areas of the 20 DMC Unit contractors. It is reasonable to initially assume that a variety of vegetation types and wildlife resources in the study area could potentially be affected by the long-term water service contract renewals.

Baseline information on biological resources in the DMC Unit project area was compiled primarily from existing literature and information gathered from water district general managers and staff. Data sources included the CVPIA Draft PEIS (Reclamation 1997a), Draft EA for Eastside/Westside Water Transfer/Exchange (Tetra Tech 2000), Draft Biological Opinion on Operation of the CVP and Implementation of the CVPIA (Reclamation and Service 2000), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), vegetation categories derived from CALVEG data (Matyas and Parker 1980), the CDFG California Natural Diversity Database, and the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California.

DOCUMENTS ADDRESSING POTENTIAL IMPACTS TO LISTED SPECIES ASSOCIATED WITH DELIVERIES TO THE DELTA-MENDOTA CANAL UNIT

Reclamation and DWR are currently cooperating in conducting endangered species consultations to address the combined long-term operations of the CVP and SWP. Reclamation is the lead federal agency and DWR is the lead state agency for these consultations. Reclamation is consulting with the Service and NOAA Fisheries regarding potential operational impacts to species listed pursuant to the federal Endangered Species Act. DWR is consulting with CDFG regarding potential operational impacts to species listed pursuant to the California Endangered Species Act. The OCAP is a detailed analysis and explanation of the criteria and procedures for conducting combined CVP and SWP operations.

The OCAP biological assessment for fisheries (Reclamation 2004a) and the OCAP biological assessments for terrestrial (plant and wildlife) species (Reclamation 2004b, 2004c) address the potential environmental consequences of continuing CVP and SWP

operations on listed species and analyze the effects of proposed operations through 2030. The OCAP biological assessments include descriptions of the actions, the biology of the listed species, and the modeling of present and future conditions resulting from continuing operations. The OCAP biological assessment for fisheries (Reclamation 2004a) addresses the continued CVP and SWP operations on fishery resources including winter-run and spring-run chinook salmon, Central Valley steelhead, and delta smelt. It also recommends ongoing actions to reduce impacts to federal and state listed species. The modeling used in the preparation of these documents accounts for several considerations, including the appropriate levels of development, and operations associated with legal decisions and related water facilities and projects, including those in the West San Joaquin Division. The OCAP biological assessment for terrestrial species (Reclamation 2004b) addresses the effects of continued CVP and SWP operations on wildlife and plant species that are listed or proposed for listed under the federal Endangered Species Act, including the bald eagle, California clapper rail, salt marsh harvest mouse, riparian brush rabbit, riparian woodrat, California red-legged frog, giant garter snake, valley elderberry longhorn beetle, Suisun thistle, and soft bird's beak. The OCAP terrestrial species biological assessment (Reclamation 2004c) also covers wildlife and plant species that are listed or proposed for listing under the California Endangered Species Act, including bank swallow, Swainson's hawk, and western yellow-billed cuckoo.

The OCAP biological opinion (NOAA Fisheries 2004) concurs with the determination made in the OCAP biological assessments (fisheries and terrestrial) (Reclamation 2004a, 2004b, 2004c) that the effects of the action of long-term operation of the CVP and SWP are not likely to adversely affect the listed species covered by the consultation (as listed above). The OCAP biological opinion covers formal and early consultation for the operations of the CVP and SWP; it includes two separate effects sections, one for formal consultation and one for early consultation, as well as an incidental take statement for formal consultation and a preliminary incidental take statement for early consultation.

Early consultations are intended to reduce the potential for conflicts between listed species or critical habitat and proposed actions. Early consultation is an optional process that occurs before a prospective applicant files an application for a federal permit or license. Early consultation results in a preliminary biological opinion, except that the incidental take statement provided does not constitute authority to take listed species. When actions have been completed, the Service formalizes the early consultation portion of the biological opinion if the project description and effects are the same as those in the preliminary biological opinion. If there are additional effects resulting from project elements, consultation on the biological opinion will be reinitiated.

The formal consultation in the OCAP biological opinion covers proposed 2020 operations of the CVP including the Trinity River Mainstem Record of Decision, flows on the Trinity River, increased water demands on the American River, delivery of CVP water to the proposed Freeport Regional Water Project, water transfers, long-term EWA, operation of the TFCF, and operation of the SWP-CVP intertie. The formal consultation in the biological opinion also covered the effects of operations of the SWP including water transfers and the operations of the North Bay Aqueduct, Suisun Marsh Salinity Control Gates, and the John E. Skinner Delta Fish Protective Facility.

Early consultation effects include the operation of components of the South Delta Improvement Program, including pumping of 8,500 cfs at the SWP Banks Pumping Plant, permanent barrier operations in the South Delta, the long-term EWA, water transfers, and CVP and SWP operational integration. When these actions have been completed, the Service will formalize the early consultation portion of the biological opinion by either finalizing the effects in the preliminary biological opinion or reinitiating consultation on the biological opinion. Many of these projects are discussed in more detail in Chapter 1, Purpose and Need.

Since listed fishery and terrestrial species and habitat affected by CVP (and SWP) operations that serve to deliver water to the DMC Unit have been evaluated extensively in the OCAP biological assessments (Reclamation 2004a, 2004b, 2004c) and corresponding OCAP biological opinion (NOAA Fisheries 2004), this EA will not address the potential impacts of long-term contract renewals to listed fishery or terrestrial resources outside the DMC Unit service area. In addition, listed fishery and terrestrial species and habitat have been extensively analyzed in the DMC Unit biological assessment, presented under separate cover (Reclamation 2003). The DMC Unit biological assessment was submitted to the Service in July 2003 and a biological opinion is pending. In summary, impact evaluations of those listed species requiring consultation under the federal ESA are addressed one of the three OCAP biological assessments (Reclamation 2004a, 2004b, 2004c), all of which are available under separate cover.

AFFECTED ENVIRONMENT

The analysis of fisheries and terrestrial impacts in this EA is limited to impacts to non-listed species that could occur within or affected by deliveries to the DMC Unit service area.

Historically, the region surrounding the DMC Unit contained a diverse and productive patchwork of aquatic, wetland, riparian forest, and terrestrial habitats that supported abundant populations of resident and migratory species of wildlife (Tetra Tech 2000). Huge herds of pronghorn antelope, tule elk, and mule deer grazed the prairies, and large

flocks of waterfowl used the extensive wetlands. The major natural plant communities included grasslands, vernal pools, marshes, and riparian forests. Agricultural development and the conversion of natural habitat to agricultural uses began in the early to mid-1800s and intensified in the later 1800s, when the railroads provided the means to transport agricultural products to much larger markets.

Land uses in the region include agricultural, residential, and M&I uses. Over the years, land has been converted from native habitats to cultivated fields, pastures, residences, water impoundments, flood control structures, and other developments. Agricultural land comprises the majority of the DMC Unit project area and includes row crops, pastures, orchards, and vineyards. Almost half of the irrigated acreage in the San Joaquin region is planted with grains, hay, and pasture (Reclamation 1997a). Orchards are planted on about one-third of the irrigated acres, with cotton and row crops grown on most of the remaining lands.

As a result of this historical conversion of native habitats, many species have been displaced or extirpated from the region. Most of the species that occurred historically are now restricted to habitat patches that are fragmented and isolated, making it difficult for viable populations to exist. Some species have adapted to portions of the new landscape and are able to maintain populations. However, as a result of the largely fragmented habitats, the potential for expansion or growth of these populations is greatly reduced. Because of the reduction in habitat available to these species, remnants of habitats such as wetlands and riparian forests are increasingly valuable and important to resident and migratory wildlife species.

FISHERIES

On the arid west side of the San Joaquin River basin, relatively small intermittent streams drain the Coast Ranges but rarely reach the San Joaquin River. On the east side, numerous streams and three major rivers drain the western Sierra Nevada and provide flow to the San Joaquin River. The lower San Joaquin River is located within the DMC Unit beginning at the Mendota Pool. Mud and Salt Sloughs are tributaries to the San Joaquin River that receive drainage (including tile water and tailwater) from the northern districts, as well as other drainage from their watersheds.

Historical fishery resources within the project area were different from the fishery resources present today (Reclamation 1997a). Many native species have declined in abundance and distribution, and several introduced species have become well established. The major factors producing changes in aquatic habitat within the project area are habitat modification, species introduction, and over-fishing of fishery resources that originate in

the project area. These factors and anthropogenic activities within the project area have adversely affected the fisheries resources in the area.

The San Joaquin River in the vicinity of the DMC Unit is characterized as a warm-water, Deep-Bodied Fishes Zone composed of a variety of habitats, ranging from slow-moving backwaters with emergent vegetation to the shallow tule beds and deep pools of slow-moving water in the main river (Moyle 1976). The environment is dominated by a warm-water habitat, but also supports anadromous, cold-water chinook salmon. The natural habitat and water quality of the river and Mud and Salt Sloughs have been highly modified by the addition of canals, agricultural drainwater, and seasonal regulation of main stem river flows.

The fish community in the area is dominated by introduced species and reduced populations of the remaining native warm-water species. Historically, the upper reaches of the San Joaquin River and its tributaries have provided habitat for chinook salmon and steelhead trout. Spring-run chinook historically used the upper reaches of the San Joaquin River, but was extirpated when Friant Dam was completed in 1949. Spring-run chinook was probably eliminated by 1930 from the Stanislaus, Tuolumne, and Merced Rivers as a result of the construction of water storage facilities. Both fall-run chinook salmon and steelhead trout continue to use these tributaries; their returns have been low for a number of years. The Merced River Fish Hatchery, operated by CDFG, produces fall-run chinook salmon. This facility is the only salmon production facility located within the San Joaquin River basin.

Little information exists about fishery resources in water bodies located within the DMC Unit study area. The intermittent streams located within the study area are not known to support anadromous fish and are unlikely to support populations of resident fish because of their hydrologic conditions, which are often characterized by low flows, increased temperatures, and reduced water quality. The numerous water conveyance facilities and water supply and drainage canals could support warm-water fish, such as bass, crappie, sunfish, catfish, and shad.

Laboratory and field research has demonstrated that elevated waterborne and/or dietary concentrations of several trace elements in the San Joaquin Valley drainwaters are toxic to fish and wildlife. Selenium is the most toxic of these elements; other constituents include arsenic, boron, chromium, mercury, molybdenum, and salts (SJVDP 1990). Elevated selenium levels have been detected in a wide variety of fish in the San Luis Unit area, including chinook salmon and striped bass (Hamilton et al. 1986; Saiki and Palawski 1990). The bio-accumulative food chain threat of selenium contamination on fish and aquatic birds has also been well documented.

VEGETATION AND WILDLIFE

This section discusses land use and land cover types within the DMC Unit. The categories discussed below correspond to the land use and land cover types displayed on the figures in Section 3.1, Contractor Service Area Descriptions. It also includes a discussion of vegetation types, plants, and animals located in and adjacent to the DMC Unit project area. Lists of common and scientific names of plants and animals are provided in Appendix B.

Natural Communities

Wetlands

Available wetland habitats in the two-mile buffer area around the project area include both riparian corridors and the more classic wetland habitat with emergent vegetation associated with the San Joaquin River.

Palustrine Wetlands. Palustrine wetlands include any nontidal wetlands not classified as lacustrine, estuarine or riverine and have no deepwater habitat associations. In the San Joaquin Valley, this classification includes both permanent and seasonal fresh emergent wetlands.

Permanent Fresh Emergent Wetlands. In the San Joaquin Valley, the topography is generally level or gently rolling. Wetlands follow basin contours or occur in conjunction with riverine or lacustrine environments. Subtypes of permanent emergent wetlands are generally classified by species presence and/or their association with specific terrestrial habitats. Because emergent wetlands are typically inundated for most of the year, the roots of vegetation have evolved to thrive in an anaerobic environment. Characteristic floral species are erect, rooted hydrophytes dominated by perennial monocots such as the common tule, cattail, various sedges, and spike rushes. Permanent wetland habitat can occur on virtually any slope or exposure that provides a saturated depression.

Seasonal Fresh Emergent Wetlands. In the San Joaquin Valley, seasonal fresh emergent wetlands most often occurred in grassland and saltbush areas. A broad description of a seasonal wetland would include any area that ponds water during the wet season. Vegetation may vary from Italian rye grass in the driest areas to spike rush in the wettest. Cattail species are conspicuously absent from seasonal wetlands as they are indicative of permanent wetlands. These wetlands were historically composed of vast areas that, although inundated only periodically, provided crucial seasonal habitat for many wildlife species, most conspicuously for waterfowl and other migrants. They can occur as a subtype in almost any community.

Vernal Pools. Prior to the era of the plow in the Central Valley, two forms of vernal pool were historically widespread in the grassland and saltbush regions of the San Joaquin River basin. The "valley" pool was typically found in areas with saline or alkaline soils such as basins or low-lying plains. "Terrace" pools were common in the neutral or slightly acidic soils of the more upland grasslands of the California prairie.

Vernal pools are seasonal wetlands that form in shallow depressions underlain by a substrate near the surface that restricts the percolation of water. They are characterized by a barrier to overland flow that causes water to collect and pond. These depressions fill with rainwater and runoff from adjacent areas during the winter and may remain inundated until spring or early summer, sometimes filling and emptying during the wet season.

Vernal pools undergo four distinct annual phases: wetting, inundation, drying and drought. Each phase can be crucial to the life cycle of the species of plant and animal that have evolved in a given pool type. Although the vegetation composition of vernal pools varies with pool type, land use practices, annual rainfall and temperature variation, the vegetation in relatively undisturbed vernal pools is typically characterized by native annual species, many of which are endemic to vernal pools or vernal pool-swale systems and many of which are obligate symbiotes. Annual grasses are conspicuously absent as a descriptive species of vernal pools.

Riparian Habitat

The Central Valley's riparian habitats are dominated by cottonwood and willow near watercourses. Sycamore, box elder, and valley oak dominate the less frequently flooded higher terraces. Floodplain habitats above the riparian zone typically do not support wetland vegetation, but are hydrologically connected to rivers and riparian forests by periodic flooding and can be considered with them as an ecological unit. Streams historically flooded during the winter rainy season sometimes dry up partially or completely during summer droughts.

Riparian vegetation occurs in valleys and bottomlands bordered by gently sloping alluvial fans and dissected terraces and coastal plains. Riparian vegetation generally consists of woodlands or forests of broad-leaved deciduous hardwood trees as the overstory, with a variety of shrubs and vines composing the midstory, and a few grass and forb species and vines composing the understory. The floodplains of riparian communities are usually well-developed. Fluvial processes such as flooding, with its resulting sediment deposition and bank erosion, create three characteristic riparian landforms: gravel point bars, low terraces, and high terraces. Each landform has a different hydrology because of its physical relationship to the aquifer and flooding.

Grassland/Herbaceous and Unknown Rangeland

Grasslands in the Central Valley were originally dominated by native perennial grasses such as needlegrass and alkali sacaton. Currently, grassland vegetation is characterized by a predominance of annual or perennial grasses in an area with few or no trees and shrubs. Annual grasses found in grassland vegetation include wild oats, soft chess, ripgut grass, medusa head, wild barley, red brome, and slender fescue. Perennial grasses found in grassland vegetation are purple needlegrass, Idaho fescue, and California oatgrass. Forbs commonly encountered in grassland vegetation include long-beaked filaree, redstem filaree, dove weed, clovers, Mariposa lilies, popcornflower, and California poppy. Vernal pools found in small depressions with an underlying impermeable layer are isolated wetlands within grassland vegetation.

Rangeland communities are composed of similar grasses, grass-like plants, forbs, or shrubs, which are grazed by livestock. Forbs commonly encountered in grassland vegetation include long-beaked filaree, redstem filaree, dove weed, clovers, Mariposa lily, popcornflower, and California poppy. Most of the grasslands in California are dominated by naturalized annual grasses with perennial grasses existing in relict prairie communities or on sites with soil or water conditions unfavorable for annual grasses, such as on serpentine. Grassland vegetation occurs from sea level to about 3,900 feet in elevation. Grassland communities as a whole have relatively high species diversity when compared to other California plant communities.

Grassland habitats are important foraging areas for black-shouldered kite, red-tailed hawk, Swainson's hawk, northern harrier, American kestrel, yellow-billed magpie, loggerhead shrike, savannah sparrow, American pipit, mourning dove, Brewer's blackbird, red-winged blackbird, and a variety of swallows. Birds such as killdeer, ring-necked pheasant, western kingbird, western meadowlark, and horned lark nest in grassland habitats. Grasslands also provide important foraging habitat for the coyote and badger because this habitat supports large populations of small prey species, such as the deer mouse, California vole, pocket gopher, and California ground squirrel. Common reptiles and amphibians of grassland habitats include western fence lizard, common kingsnake, western rattlesnake, gopher snake, common garter snake, western toad, and western spadefoot toad.

Agricultural Communities

Agricultural communities within the project area are very diversified, and almost half of the irrigated acreage in the San Joaquin region is planted with grains, hay, and pasture (Reclamation 1997a). Orchards are planted on about one-third of the irrigated acres, with cotton and row crops grown on most of the remaining lands.

Although natural communities provide the highest value for wildlife, many of these historic natural habitats have been largely replaced by agricultural habitats with varying degrees of benefits to wildlife. The intensive management of agricultural lands, including soil preparation activities, crop rotation, grazing, and the use of chemicals, effectively reduces the value of these habitats for wildlife. However, many wildlife species have adapted to some degree to particular crop types and now use them for foraging and nesting. Orchards, vineyards, and cotton fields generally provide relatively low-quality wildlife habitat because the frequent disturbance results in limited foraging opportunities and a general lack of cover. Pasture and row crops provide a moderate-quality habitat with some limited cover and foraging opportunities.

Cropland and Pasture. Pasture habitat can consist of both irrigated and unirrigated lands dominated by perennial grasses and various legumes. The composition and height of the vegetation, which varies with management practices, also affects the wildlife species composition and relative abundance. Irrigated pastures may offer some species habitats that are similar to those of both seasonal wetlands and unirrigated pastures. The frequent harvesting required, which reduces the overall habitat quality for ground-nesting wildlife, effectively reduces the value of the habitat. Irrigated pastures provide both foraging and roosting opportunities for many shorebirds and wading birds, including black-bellied plover, killdeer, long-billed curlew, and white-faced ibis. Unirrigated pastures, if lightly grazed, can provide forage for seed-eating birds and small mammals. Ground-nesting birds, such as ring-necked pheasant, waterfowl, and western meadowlark, can nest in pastures if adequate vegetation is present. Small mammals occupying pasture habitat include California voles, Botta's pocket gophers, and California ground squirrels. Raptors including red-tailed hawks, white-tailed kites, and prairie falcons prey upon the available rodents. In areas where alfalfa or wild oats have been recently harvested, the large rodent populations can provide high-quality foraging habitat for raptors.

The habitat value in cropland is essentially regulated by the crop production cycle. Most crops in California are annual species and are managed with a crop rotation system. During the year, several different crops may be produced on a given parcel of land. Many species of rodents and birds have adapted to croplands, which often requires that the species be controlled to prevent extensive crop losses. This may require intensive management and often the use of various pesticides. Rodent species that are known to forage in row crops include the California vole, deer mouse, and the California ground squirrel. These rodent populations are preyed upon by Swainson's hawks, red-tailed hawks, and black-shouldered kites.

Orchards and Vineyards. Orchard-vineyard habitat consists of cultivated fruit or nut-bearing trees or grapevines. Orchards are typically open, single-species, tree-dominated

habitats and are planted in a uniform pattern and intensively managed. Understory vegetation is usually sparse; however, in some areas, grasses or forbs are allowed to grow between vineyard and orchard rows to reduce erosion. In vineyards, the rows under the vines are often sprayed with herbicides to prevent the growth of herbaceous plants.

Wildlife species associated with vineyards include the deer mouse, California quail, opossum, raccoon, mourning dove, and black-tailed hare. Nut crops provide food for American crows, scrub jay, northern flicker, Lewis' woodpecker, and California ground squirrel. Fruit crops provide additional food supplies for yellow-billed magpies, American robin, northern mockingbird, black-headed grosbeak, California quail, gray squirrel, raccoon, and mule deer. Loss of fruit to grazers often results in species management programs designed to force these species away from the orchards.

Idle or Retired Farmland. Lands of this category are similar to abandoned farmlands in the ruderal or unknown rangeland category, but with less time out of agricultural production. Similarly, the habitat value of these lands may vary with land management practices.

AREAS NOT AFFECTED BY USE OF CVP WATER

Four natural areas in the vicinity of the project area that are managed as uplands do not receive water from the Delta-Mendota Canal (Wilbur 2000). These areas include the Little Panoche, Lower Cottonwood Creek, O'Neill Forebay, and Upper Cottonwood Creek Wildlife Management Areas. The Upper and Lower Cottonwood Creek Wildlife Management Areas are located adjacent to San Luis Reservoir. The O'Neill Forebay Wildlife Management Area is located adjacent to O'Neill Forebay. The Little Panoche Wildlife Management Area is located on Little Panoche Creek in the hills approximately 10 miles southwest of the Eagle Field Water District.

AREAS AFFECTED BY USE OF CVP WATER

Each of the DMC Unit contractors and several Significant Natural Areas in the area of the DMC Unit study area use CVP water. The individual contractors are described in Section 3.1. The following sections describes several of the larger Significant Natural Areas affected by CVP water.

Significant Natural Areas

The 77 Significant Natural Areas[1] in the San Joaquin Valley, while scattered throughout the region, are also concentrated in the grasslands of the San Joaquin Valley in freshwater marsh, valley sink scrub, and grassland vernal pool habitats. These areas are important to waterfowl and shorebirds that winter and nest in the San Joaquin Valley, as well as for several special-status species, including the giant garter snake, Swainson's hawk, tricolored blackbird, colusa grass, delta button celery, San Joaquin woolythreads, and soft birds-beak. Historically, the San Joaquin River basin was a large floodplain of the San Joaquin River that supported vast expanses of permanent and seasonal marshes, lakes, and riparian areas. Almost 70 percent of the basin has been converted to irrigated agriculture, with wetland acreage estimated to have been reduced to approximately 120,300 acres. In combination with the adjacent uplands, the wetland complex is referred to as "the Grasslands" and consists of approximately 160,000 acres of private and public lands. Approximately 53,300 acres of the Grasslands are permanently protected in state or federal wildlife refuges or in federal conservation easements.

Several Significant Natural Areas are present in the project area or are located nearby. Significant Natural Areas present in the project area include the Lower and Upper Cottonwood Creek Wildlife Management Areas, Mendota Wildlife Management Area, and O'Neill Forebay.[2] Significant Natural Areas present near the project area include Los Banos Wildlife Management Area, Little Panoche Wildlife Management Area, Merced National Wildlife Refuge, North Grasslands Wildlife Management Area, San Joaquin River National Wildlife Refuge, San Luis National Wildlife Refuge, and Volta Wildlife Management Area.

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[1] The Significant Natural Areas Program is part of the CDFG's Wildlife and Habitat Data Analysis Branch. It was legislatively established in 1981 (Fish and Game Code Sections 1930–1933) and mandated to develop and maintain a data management system for natural resources; identify the most "significant natural areas" in California; ensure the recognition of these areas; seek the long-term perpetuation of these areas; and provide coordinating services for other public agencies and private organizations interested in protecting natural areas. The Significant Natural Areas Program analyzes data from the California Natural Diversity Database. The following biological criteria are used to identify Significant Natural Areas: areas supporting extremely rare species or natural communities and areas supporting associations or concentrations of rare species or communities. Significant Natural Area data have been used for bioregional conservation planning, environmental review, designation of special-status areas on public lands and land acquisition planning.

[2] All of the areas discussed, except Lower and Upper Cottonwood Creek Wildlife Management Areas and the San Joaquin River National Wildlife Refuge, receive CVP water supplies to meet Level 2 requirements, in accordance with the CVPIA.

Lower and Upper Cottonwood Creek Wildlife Management Areas

The Lower and Upper Cottonwood Creek Wildlife Management Areas are located in both Merced and Santa Clara Counties, approximately 36 miles east of the city of Gilroy. The Cottonwood Creek Wildlife Management Area consists of 6,315 acres of steep oak-grassland (upper unit) and steep hilly grassland (lower unit). The area is accessible only by foot. Wildlife in the area includes wild pigs, black-tailed deer, gray fox, and over 100 species of birds. Allowable recreational activities in the Cottonwood Creek Wildlife Management Areas include wildlife viewing, boat access (hand-carried only), fishing, hiking, and camping.

Mendota Wildlife Management Area

The 12,425-acre Mendota Wildlife Management Area is the largest publicly owned and managed wetland in the San Joaquin Valley (Reclamation 1997a). Established between 1954 and 1966, the refuge is located on a part of the Coelho Family Trust and is adjacent to the Fresno Slough Water District, the Tranquillity Public Utilities District, Reclamation District #1606, Tranquillity Irrigation District, and the 900-acre Alkali Sink Ecological Reserve. Approximately 8,300 acres of wetlands are maintained on the refuge, including almost 6,800 acres of seasonal wetlands, which are used by migratory ducks and shorebirds. To feed these animals, several crops, including corn, barley, milo, and safflower, are raised. Giant garter snakes have also been observed on the refuge. The water used to maintain these seasonal wetlands is purchased directly from the CVP (Huddleson 2000).

Los Banos Wildlife Management Area

Purchased in 1929, the Los Banos Wildlife Management Area was the first of a series of waterfowl refuges established in California to manage habitat for wintering waterfowl. Expanded from its original 3,000 acres, there are now 6,217 acres of wetland habitat, which includes lakes, sloughs, and managed marshes. The refuge provides habitat for western pond turtles, raccoons, striped skunks, beaver, muskrat, and over 200 varieties of bird species, including ducks, geese, shorebirds, coots, wading birds, and cranes. Pintail ducks and lesser snow geese are the most common waterfowl on the refuge. Swainson's hawks are known to nest near the refuge and to use the refuge for foraging. Other special-status species known to occur on the refuge include the giant garter snake and delta button celery (Reclamation 1997b).

Merced National Wildlife Refuge

The Merced National Wildlife Refuge was established in 1951 to alleviate crop depredation and provide waterfowl habitat (Reclamation 1997a). Originally a farm, the

original 2,562-acre refuge has expanded over the years. The refuge now totals 8,234 acres, including the 2,464 Arena Plains Unit. This refuge is one of the most important wintering areas in California, supporting snow and Ross' geese, sandhill cranes, and variety of shorebirds. Public use facilities at the refuge include observation platforms, interpretive panels, and a public hunting area, which is open during the hunting season. The Merced National Wildlife Refuge is located approximately 13 miles east of the Del Puerto Water District.

North Grasslands Wildlife Management Area

The North Grasslands Wildlife Management Area was purchased by the State of California in April 1990 and is managed by the CDFG (Reclamation 1997a). It is located within five miles of the Del Puerto Water District and includes three separate units. The China Island and Salt Slough units contain 5,556 acres of primarily agricultural land and pasture, but also have extensive river and slough channels with riparian edges. These two units receive water directly from the CVP (Wilbur 2000); however, the Salt Slough unit does not have a firm historical water supply. North Grasslands Wildlife Management Area provides habitat for a variety of wildlife species. Ducks are the most common waterbirds using the refuge, but sandhill cranes, shorebirds, and geese, including the Aleutian Canada goose, are also common. Agricultural crops irrigated with water from the Delta-Mendota Canal feed wintering migratory birds.

San Luis National Wildlife Refuge Complex

The 26,609-acre San Luis National Wildlife Refuge Complex is located approximately six miles east of the Del Puerto Water District. The refuge is a mixture of managed seasonal and permanent wetlands, riparian habitat associated with three watercourses and native grasslands, alkali sinks and vernal pools. The San Luis National Wildlife Refuge buys water from the CVP to irrigate seasonal wetlands and cereal crops (Chouinard 2000). The refuge provides habitat for waterfowl, including ducks, geese, and shorebirds, as well as tule elk and other endangered species. The largest concentration of mallard-pintails and green-winged teal in the San Joaquin Valley is also found here. Major public use occurs in the refuge complex, including interpretive wildlife observation programs, hiking, fishing, waterfowl and pheasant hunting.

San Joaquin National Wildlife Refuge

The San Joaquin National Wildlife Refuge is located approximately 10 miles west of Modesto on Highway 132 and within the floodplain of the confluence of the San Joaquin, Stanislaus, and Tuolumne Rivers. Refuge lands consist of oak-cottonwood-willow riparian forest, pastures, agricultural fields, and wetlands. This refuge was established in 1987 with an original land base of 1,638 acres. Through recent land acquisitions, the refuge has

increased to 6,642 acres with an approved refuge boundary of 12,877 acres. The San Joaquin River National Wildlife Refuge played a key role in the recovery and March 2001 delisting of the Aleutian Canada goose by providing critical habitat for the species. The lands in the refuge form a mosaic of riparian habitat, wetlands, and agricultural fields. It is the primary wintering site of 98 percent of the Aleutian Canada geese that winter in the valley, plus it is a major wintering and migration area for lesser and greater sandhill cranes, cackling Canada geese, and white-fronted geese. Because the refuge is near large population centers, opportunities exist for future public use, including wildlife observation and nature interpretation and education.

Volta Wildlife Management Area

The 3,000-acre Volta Wildlife Management Area is located approximately five miles east of the Centinella Water District. The refuge maintains more than 1,800 acres of wetlands, including 1,400 acres of moist soil plants; 720 acres of alkali sink habitat are preserved on the refuge as a rare ecological community (Reclamation 1997a). The Volta Wildlife Management Area provides habitat for a variety of bird species, including ducks, geese, shorebirds, coots, and wading birds. Black-necked stilts, sandpipers, dunlins, and dowitchers dominate shorebird species.

CURRENT GENERAL PLAN PROTECTIVE AND MANAGEMENT MEASURES

Measures to mitigate or offset impacts to sensitive species and communities have been developed and implemented by the cities and counties in the project area as part of their general plans. Some of these goals and policies are currently being reviewed and modified by city and county agencies as part of the general plan environmental impact report process. The most current measures for the affected cities and counties in the project area are described below.

Stanislaus County

Documentation supporting the Conservation/Open Space Element of the Stanislaus County General Plan emphasizes the conservation and management of economically productive natural resources and conservation of open space lands (any parcel or area of land or water that is essentially unimproved). The element (1) promotes the protection, maintenance, and use of the county's natural resources, with special emphasis on scarce resources and those that require special control and management; (2) prevents wasteful exploitation, destruction, and neglect of natural resources; (3) recognizes the need for natural resources to be maintained for their ecological values as well as for their direct benefit to people; (4) preserves open space lands for outdoor recreation including scenic, historic, and cultural areas; and (5) preserves open space for public health and safety, including areas

subject to landslides, flooding, and high fire risk, and areas required for the protection of water and air quality.

Goal One encourages the protection and preservation of natural and scenic areas throughout the county by:

- Maintaining the natural environment in areas dedicated as parks and open space.
- Ensuring compatibility between natural areas and development.
- Protecting from development areas of sensitive wildlife habitat and plant life (e.g., vernal pools, riparian habitats, flyways, and other waterfowl habitats) including those habitats and plant species listed in the General Plan Support Documentation or by state or federal agencies.
- Protecting and enhancing oak woodlands and other native hardwood habitat.

San Joaquin County

Implementing the Natural Resources Regulations as identified in the Draft General Plan 2010 would protect important biotic resources within San Joaquin County. The county's policies and implementation measures related to the protection and management of biological resources include special-status species, sensitive natural communities, and fisheries.

The final environmental impact report on the San Joaquin County Comprehensive Planning Program (Baseline Environmental Consulting 1992) recommends that the county (1) develop an integrated vegetation management program for properties owned and maintained by the county and (2) protect habitat areas large enough to be minimally affected by urban development including maintaining connection of habitat and restoring and enhancing degraded ecosystems such as historic salmon runs on the Mokelumne and Calaveras Rivers.

City of Tracy

The City of Tracy plans to conserve natural resources through the protection and enhancement of permanently preserved open space. For actions associated with the policies listed below, refer to *City of Tracy General Plan: An Urban Management Plan* (City of Tracy and the Planning Center 1993).

The City of Tracy will minimize impacts of development on waterways, riparian corridors, and adjacent buffer areas and will seek opportunities to preserve or establish wildlife

habitat, in conjunction with other uses and developments within the Tracy Urban Management Plan Area.

Fresno County

Policies in the Fresno County General Plan seek to protect riparian and wetland habitats while allowing compatible uses where appropriate. Related policies are included in Section LU-C, River Influence Areas; Section OS-A, Water Resources; Section OS-E, Fish and Wildlife Habitat; and Section OS-F, Vegetation.

- To conserve the function and values of wetland communities and related riparian areas throughout Fresno County while allowing compatible uses where appropriate. Protection of these resource functions positively affects aesthetics, water quality, floodplain management, ecological function, and recreation/tourism. Policies in this section seek to protect natural areas and to preserve the diversity of habitat in the county. Related policies are included in Water Resources, Forest Resources, Wetland and Riparian Areas, Vegetation, and River Influence Areas elements.

- To help protect, restore, and enhance habitats in Fresno County that support fish and wildlife species so that populations are maintained at viable levels. Policies in this section seek to protect native vegetation resources primarily on private land within the county.

- To preserve and protect the valuable vegetation resources of Fresno County.

For more detailed information on the direction of the goals listed below, refer to the Fresno County General Plan Background Report (County of Fresno 2000a).

Merced County

Merced County has the following goals and objectives regarding conservation of natural resources.

- Habitats that support rare, endangered, or threatened species are not substantially degraded. Rare and endangered species are protected from urban development and are recognized in rural areas.

- Local, state, and federal managed lands are recognized.

For more information on the policies developed for these goals and objectives, refer to the Merced County Year 2000 General Plan (Merced County 1990).

ENVIRONMENTAL CONSEQUENCES

Impacts to biological resources would be considered adverse if special-status species or their habitats, as designated by federal, state, or local agencies, were affected directly or indirectly by project-related activities. These potential impacts are evaluated in other documents, as previously described. In addition, impacts to biological resources would be considered significant if substantial loss, reduction, degradation, disturbance, or fragmentation occurred in native species habitats or in their populations. These impacts could be short- or long-term impacts. For example, short-term or temporary impacts may occur during project implementation, and long-term impacts may result from the loss or change of vegetation and thereby loss of the capacity of habitats to support wildlife populations.

NO-ACTION ALTERNATIVE

Requirements of the CVPIA biological opinion (Reclamation and Service 2000) would be met under the No-Action Alternative, including continuation of ongoing species conservation programs. The renewal of long-term contracts would not involve construction of new facilities or installation of structures that would alter current land uses. The renewal of CVP contracts for the project area would only continue water deliveries that accommodate current land uses. Implementation of the No-Action Alternative would not impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under the No-Action Alternative would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in adverse impacts on biological resources, including fish, vegetation, and wildlife, in the DMC Unit study area. The renewal of CVP contracts for the study area would only continue water deliveries that accommodate current land uses. Implementation of Alternative 1 would not substantially impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under Alternative 1 would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not result in adverse impacts on biological resources, including fish, vegetation, and wildlife, in the DMC Unit study area. The renewal of CVP contracts for the study area would only continue water deliveries that accommodate current land uses. Implementation of Alternative 2 would not substantially impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under Alternative 2 would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, would not cause a cumulative impact on the biological resources of the DMC Unit. Long-term contracts provide for the delivery of water for refuge habitat and will continue to be used in conjunction with and to the benefit of ongoing wetland and riparian habitat conservation programs, including the Central Valley Habitat Joint Venture and the San Joaquin River Riparian Habitat Restoration Program. The renewal of long-term contracts in the DMC Unit obligate the delivery of the same contractual amount of water to the same lands without the need for additional facility modifications or construction and will not incrementally contribute to any physical impacts to study area biological resources.

SECTION 3.10: CULTURAL RESOURCES

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on cultural resources in the DMC Unit.

AFFECTED ENVIRONMENT

Renewal of the long-term water service contracts between Reclamation and the 20 DMC Unit contractors constitutes an "undertaking" under federal definitions. Therefore, potential impacts to cultural resources are being considered in this EA in compliance with a number of federal rules and regulations, as discussed below under Regulatory Setting.

For cultural resources, the area of potential effect of the undertaking consists of the contract service areas of the 20 DMC Unit contractors. The district service areas, which are previously described in Section 3.1, Contractor Service Area Descriptions, incorporate extensive areas along the western portion of the San Joaquin Valley and the interface between the valley and the lower reaches (eastern margin) of the Diablo Range.

The remainder of this section details the potential effects of the undertaking to cultural resources that are considered eligible or potentially eligible for inclusion on the National Register of Historic Places (NRHP) and that are located or may be present within the contract service areas of the 20 DMC Unit contractors. Included at the end of this section are recommendations for actions that the DMC Unit contractors should take and that, if adopted, will ensure that any effects of the undertaking are reduced to less than adverse levels.

INFORMATION SOURCES AND BACKGROUND DATA FOR AFFECTED ENVIRONMENT

This section provides a brief overview of environmental, prehistoric, ethnographic, and historic contexts for the area encompassed by the DMC Unit. Much of this background information has been derived from anthropological, archaeological, and historical studies conducted over the past several decades on both public and private lands within the service areas of the 20 DMC Unit contractors. Also discussed are the types of cultural resources known or suspected of being present within these service areas.

In order to secure information concerning the types and general distribution of known archaeological and historical sites and to estimate whether additional sites may remain undiscovered within individual district lands, the following sources were consulted:

- A search of archaeological survey, site, and other records and documents maintained by the California Historical Resources Information System, Central

California Information Center (CSU-Stanislaus), and the Southern San Joaquin Valley Information Center (CSU-Bakersfield).

- A review of selected published and unpublished archaeological, ethnographic, and historical reports and documents available for the overall project area.
- A review of the NRHP.
- The California Register of Historical Resources.
- The California Inventory of Historic Resources (1976).
- The California Historical Landmarks (1996).
- The California Points of Historical Interest listing (May 1992 and updates).
- The Historic Property Data File (Office of Historic Preservation current list).
- The CALTRANS Local Bridge Survey (1989).
- The Survey of Surveys (1989).

The background research and records searches were undertaken in September 2000, with specific results summarized below under Natural Environmental Context, Cultural Environmental Context, and Current Inventory of Cultural Resources.

NATURAL ENVIRONMENTAL CONTEXT

The service areas of the 20 DMC Unit contractors include primarily valley and lower foothill lands located within the central and southern San Joaquin Valley, along the western margin of the valley at the interface of the valley and the lower reaches of the Diablo Range.

This area contains a variety, but a limited number of water sources and resource zones. Prehistoric use and occupation focused on these features, particularly around the confluences of streams and within the ecotones created at the interface of foothill/valley lands. Drainages and associated natural levees and benches were moderately to intensively utilized, while uplands were visited for oak and other resources on a more seasonal basis.

Much of this area has been affected by ranching for over 100 years and by agriculture during the past 50 to 100 years. The most recent impacts derive primarily from the construction of water distribution facilities, major transportation routes (Interstate 5 in particular), and agricultural equipment and storage buildings.

PREHISTORIC CONTEXT

The CVPIA project area, inclusive of the area of potential effect, has a long and complex cultural history with distinct regional patterns that extend back more than 11,000 years. The first generally agreed-upon evidence for the presence of prehistoric peoples in the CVPIA area is represented by the distinctive fluted spear points, termed Clovis points, found on the margins of extinct lakes in the San Joaquin Valley. The Clovis points are found on the same surface with the bones of extinct animals such as mammoths, sloths, and camels. Based on evidence from elsewhere, the ancient hunters who used these spear points existed during a narrow time range of 10,900 BP to 11,200 BP.

The next cultural period represented, the Western Pluvial Lakes Tradition, thought by most to be after the Clovis period, is another widespread complex that is characterized by stemmed spear points. This poorly defined early cultural tradition is regionally known from a small number of sites in the Central Coast Range, San Joaquin Valley lake margins, and Sierra Nevada foothills. The cultural tradition is dated to between 8,000 and 10,000 years ago and its practitioners may be the precursors to the subsequent cultural pattern.

About 8,000 years ago, many California cultures shifted the main focus of their subsistence strategies from hunting to seed gathering, as evidenced by the increase in food-grinding implements found in archeological sites dating to this period. This cultural pattern is best known for southern California, where it has been termed the Milling Stone Horizon (Wallace 1954, 1978), but recent studies suggest that the horizon may be more widespread than originally described and is found throughout the CVPIA area. Radiocarbon dates associated with this period vary between 8,000 and 2,000 BP, although most cluster in the 6,000 to 4,000 BP range (Basgall and True 1985).

Cultural patterns as reflected in the archeological record, particularly specialized subsistence practices, became codified within the last 3,000 years. The archeological record becomes more complex, as specialized adaptations to locally available resources were developed and populations expanded. Many sites dating to this time period contain mortars and pestles and/or are associated with bedrock mortars, implying the intense exploitation of the acorn. The range of subsistence resources utilized and exchange systems expanded significantly from the previous period. Along the coast and in the Central Valley, archeological evidence of social stratification and craft specialization is indicated by well-made artifacts such as charmstones and beads, often found as mortuary items. Ethnographic lifeways serve as good analogs for this period.

ETHNOGRAPHIC CONTEXT

As noted above, the service areas of the 20 DMC Unit contractors are nearly coterminous with lands claimed by the Penutian-speaking Northern Valley Yokuts at the time of their initial contact with European-American populations, circa AD 1850 (Kroeber 1925; Wallace 1978). These Yokuts occupied an area extending from the crest of the Coast Diablo Range easterly into the foothills of the Sierra Nevada, north to the American River, and south to the upper San Joaquin River.

The basic social unit for the Yokuts was the family, although the village may also be considered a social, as well as a political and economic unit. Often located on flats adjoining streams, villages were inhabited mainly in the winter because it was necessary to go out into the hills and higher elevation zones to establish temporary camps during food-gathering seasons (i.e., spring, summer, and fall). Villages typically consisted of a scattering of small structures, numbering from four or five to several dozen in larger villages, each house containing a single family of from three to seven people. Larger villages, with from 12 to 15 or more houses, might also contain an earth lodge.

As with most California Indian groups, economic life for the Yokuts revolved around hunting, fishing, and collecting plants, with deer, acorns, and avian and aquatic resources representing primary staples. The Yokuts used a wide variety of wooden, bone, and stone artifacts to collect and process their food. The Yokuts were very knowledgeable of the uses of local animals and plants and the availability of raw materials that could be used to manufacture an immense array of primary and secondary tools and implements. However, only fragmentary evidence of their material culture remains, due in part to perishability and in part to the impacts to archaeological sites resulting from later (historic) land uses.

Resource Considerations, Native American Sites

The discussion of regional prehistory and ethnography provides insight into the types of Native American sites already known or likely to be present within the service areas of the 20 DMC Unit contractors, with the most frequently occurring types including the following:

- Large village sites located along the margins of all permanent streams, particularly at confluences, and other natural surface water sources (springs, marshes, and other wetlands). Additional large village sites have been documented along smaller stream courses, especially where streams merge, and particularly at the interface between major ecotones.

- Surface scatters of lithic artifacts without buried cultural deposits, resulting from short-term occupation and/or specialized economic activities.
- Petroglyphs, often in the form of cupped boulders, at or close to village sites or encampments.
- Bedrock food-processing (milling) stations, including mortar holes and metate slicks.
- Trails, often associated with migratory game animals.
- Mortuary sites, often but not exclusively associated with large village complexes.
- Isolated finds of aboriginal artifacts and flakes.

HISTORIC CONTEXT

Interior California was initially visited by Anglo-American fur trappers, Russian scientists, and Spanish-Mexican expeditions during the early part of the nineteenth century. These early explorations were followed by a rapid escalation of European-American activities, which culminated in the massive influx fostered by the discovery of gold at Coloma in 1848. The influx of miners and others during the Gold Rush set in motion a series of major changes to the natural and cultural landscape of California that would never be reversed.

Early Spanish expeditions arrived from Bay Area missions as early as 1804, penetrating the northwestern San Joaquin Valley (Cook 1976). By the mid-1820s, hundreds of fur trappers were annually traversing the valley on behalf of the Hudson's Bay Company (Maloney 1945). By the late 1830s and early 1840s, several small permanent European-American settlements had emerged in the Central Valley and adjacent foothill lands, including ranchos in the interior Coast Range.

With the discovery of gold in the Sierra Nevada, large numbers of European-Americans, Hispanics, and Chinese arrived in and traveled through the general project area. The mining communities' demand for hard commodities led quickly to the expansion of ranching and agriculture throughout the valley and logging within the foothill and higher elevation zones of the Sierra Nevada. Stable, larger populations arose and permanent communities slowly emerged in the Central Valley at this time, particularly along major transportation corridors. Of particular importance was the transformation brought about by construction of railroad lines.

The Southern Pacific and Central Pacific Railroads and a host of smaller interurban lines to the north around the City of Stockton began intensive projects in the late 1860s. By the turn of the century, nearly 3,000 miles of lines connected the cities of Modesto and Stockton with points south and north. Many of the valley's larger cities, including many in San Joaquin County and adjacent counties, were laid out as isolated railroad towns in the 1870s and 1880s by the Southern Pacific, which not only built and settled, but continued to nurture the infant cities until settlement was successful. The Southern Pacific main line proceeds through or adjacent to the entire project area.

Intensive agricultural development soon followed, since railroads provided the means for product to be transported to a much larger market. Agricultural land conversion began long before the development of water supply projects. By the end of the twentieth century, a substantial portion of the valley was being intensively cultivated, with increasing mechanization through all of the twentieth century and substantial expansion of cultivated acreage with the arrival of water from the CVP.

Resource Considerations, Historic Resources

Historic overviews for the region generally document the presence of a wide range of historic site and feature types and complexes, with types known or most likely to be present with the project area including the following:

- Historic railroad alignments.
- Two-track historic trails/wagon roads and now-paved historic road corridors.
- Water distribution systems, including levees and small and large ditch, canal, and channel systems.
- Occupation sites or homesteads and associated features such as refuse disposal sites, privy pits, barns, and sheds.
- Commercial undertakings.
- Refuse disposal site(s) associated with early communities.
- Ranch features, including standing structures, structural remnants, stock ponds, and corrals.

CURRENT INVENTORY OF CULTURAL RESOURCES

A total of 89 archaeological and historic sites are currently documented within the service areas of the 20 DMC Unit contractors. These include sites that contain exclusively prehistoric material, sites with only historic material, and sites with mixed prehistoric and historic components and structures.

Prehistoric sites are represented by large habitation areas (village sites) in which both habitation and special-use activity areas are represented; mortuary sites, usually associated with habitation sites; specialized food-procurement and food-processing sites including milling areas; and other site types representing a variety of specialized activities.

Historic sites are represented by a range of types, including buildings and structures dating to the nineteenth century; historic transportation features; water distribution systems; occupation sites and homesteads with associated features such as refuse disposal sites, privy pits, barns, and sheds; historic disposal sites associated with historic communities; and ranch complexes.

Some of these prehistoric and historic sites have been determined eligible for inclusion on the NRHP through consultation between a federal agency and the State Historic Preservation Office. Others remain unevaluated in relation to NRHP eligibility criteria.

In addition to formally recorded sites, it is clear that a large number of both prehistoric and historic sites remain undiscovered within the overall project area simply because for many areas, especially undeveloped ranch and farm lands, a formal archaeological inventory survey has never been undertaken.

Table 3.10-1 summarizes the current cultural resources inventory by DMC Unit contractor. The table also provides information concerning the cultural resource inventory within each district, as follows:

- The number of documented archaeological and historic sites that have been assigned State Trinomials, Primary Record, or State Landmark designations.
- An estimate of the land area within the district that has been surveyed for cultural resources.
- A conclusion as to whether district lands are known to contain or, if subjected to formal archaeological survey, would be likely to be discovered to contain important prehistoric or historic sites or other cultural features. This conclusion or assessment is based on (a) the results of the formal records search, (b) previous

consultation with Native American groups and historic societies as summarized in existing documents, (c) the results of prior surveys in the general or immediate vicinity, and (d) an assessment of archaeological sensitivity based on stream courses and other critical variables present within unsurveyed district lands.

Table 3.10-1
Summary of Previous Studies and Cultural Properties

Entity Name	Recorded Sites and Landmarks	Percentage Surveyed to Date	Are Undocumented Sites Likely To Be Present in District?
The West Side Irrigation District	7	30%	Yes
Plain View Water District	6	60%	Yes
City of Tracy	15	20%	Yes
Banta-Carbona Irrigation District	5	10%	Yes
West Stanislaus Irrigation District	3	1%	Yes
Patterson Water District	3	5%	Yes
Del Puerto Water District	22	35%	Yes
Centinella Water District	0	20%	Yes
Laguna Water District	0	0%	Yes
Eagle Field Water District	0	0%	Yes
Oro Loma Water District	0	0%	Yes
Mercy Springs Water District	0	0%	Yes
Widren Water District	0	1%	Yes
Broadview Water District	0	0%	Yes
Coelho Family Trust*	1	1%	Yes
Reclamation District #1606*	1	1%	Yes
Fresno Slough Water District	0	0%	Yes
Tranquillity Irrigation District*	1	2%	Yes
Tranquillity Public Utilities District	25	3%	Yes
James Irrigation District	0	25%	Yes
Total	**89**		

*District contains no sites with State Trinomial or number designations, but contains one State Historic Landmark herein counted as a “site."

ISSUES IDENTIFIED

The primary issues involving cultural resources include (a) what types of archaeological and historic sites are present within the service areas for the 20 DMC Unit contractors that could be affected by the undertaking, (b) what is the basis for determining the significance or importance of identified sites, (c) what effects might the undertaking have on important or significant sites located within the project areas, and (d) what steps might be taken to avoid, minimize, or mitigate any adverse impacts to such significant sites.

The identification of archaeological sites was resolved through (a) an evaluation of records and documents, including archaeological survey reports and archaeological site documents on file at California Historical Resources Information Centers and elsewhere, (b) archaeological and historic overview of the project area, and (c) the results of previous consultations with Native American groups and historical societies as documented in reports and files at the California Information Centers.

The significance or importance of archaeological sites located within the service areas for the 20 DMC Unit contractors has been addressed by using established procedures outlined in 36 CFR 60.4 and discussed below.

The final cultural resource issue revolves around possible impacts to archaeological and historic sites that might be determined eligible or potentially eligible for listing on the NRHP and how best to minimize or reduce such possible impacts to less than adverse levels. These issues are discussed below under Potential Effects of the Undertaking to Cultural Resources and under Mitigation Measures.

REGULATORY SETTING

Evaluation of the potential impacts of an undertaking to archaeological and historic sites must conform with Section 106 of the National Historic Preservation Act and its implementing regulations (36 CFR Part 800), Section 2(b) of Executive Order 11593, Section 101(b)(4) of NEPA, the Archaeological Resources Protection Act, the Native American Grave Protection and Repatriation Act of 1990 (if federal lands are involved), and other rules and regulations, including applicable state laws (especially, the CEQA Guidelines, as amended in October 1998). Reclamation is responsible for ensuring compliance with the federal laws, rules, and regulations.

ENVIRONMENTAL CONSEQUENCES

The objectives of this section are (a) to describe the basis for determining which cultural resources located within the service areas for the 20 DMC Unit contractors have been included, are considered potentially eligible for inclusion, or might be found to be eligible for inclusion on the NRHP and whether additional such resources may remain undiscovered within the service areas, (b) to identify and assess the potential effect of the project on eligible or potentially eligible or significant cultural resources, and (c) to outline appropriate measures that can be taken to avoid, minimize, or mitigate adverse impacts to any eligible cultural properties that could be affected by the undertaking.

SIGNIFICANCE OR IMPORTANCE OF CULTURAL RESOURCES

According to federal regulations and guidelines, significant or important cultural resources are those prehistoric and historic sites, districts, buildings, structures, and objects, as well as properties with traditional religious or cultural importance to Native Americans, that are listed or are eligible for listing on the NRHP (historic properties), according to the criteria outlined in 36 CFR 60.4. Historic properties must possess integrity of location, design, workmanship, feeling, and association and must meet at least one of the following criteria:

- Associated with events that have made significant contributions to the broad patterns of United States history.

- Associated with the lives of people significant in United States history.

- Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction.

- Has yielded or is likely to yield information important in prehistory or history.

Archaeological sites with "cultural" or traditional value are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (Advisory Council on Historic Preservation 1985). The guidelines define *cultural value* as "... the contribution made by an historic property to an on-going society or cultural system. A traditional cultural value is a cultural value that has historical depth." The guidelines further specify that "… [a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value."

As noted above, although numerous archaeological and historic sites have been documented within the service areas for the 20 DMC Unit contractors, not all of them have been evaluated for NRHP eligibility. As well, intensive-level pedestrian surveys have been undertaken within only a portion of the overall service areas.

POTENTIAL EFFECTS OF THE UNDERTAKING TO CULTURAL RESOURCES

Impacts to archaeological and historic sites occur from activities affecting the characteristics that qualify a property for inclusion on the NRHP. The criteria for assessing effects are available in the Advisory Council on Historic Preservation's Regulations for the Protection of Historic Properties at 36 CFR 800.9. Significant impacts are those considered to have an adverse effect on historic properties. Adverse effects may include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of a historic property.

- Isolation of a historic property or alteration of the character of its setting when that character contributes to the property's eligibility for the NRHP or its cultural significance.

- Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting.

Important archaeological sites within the project area include documented and undocumented prehistoric and historic sites and features, some of which may contain subsurface (buried) accumulations of cultural material.

Virtually all of the actions associated with the renewal of long-term water service contracts are within the range of "existing conditions" with respect to land use. Currently, most of the lands within the contractors' boundaries are being farmed, an activity that has been ongoing for decades. There are presently no specific plans to modify or substantially alter current land use within contract service areas on the basis of long-term water service contract renewals. Specifically, contract renewals will not alter the area of use, types of use, range of river flows, or reservoir fluctuations. No additional infrastructure will be constructed, there will be no increase in deliveries, and there will be no conversion of natural habitat into farmland or other uses.

Future needs could possibly result in proposals by one or more districts to (1) bring new lands into irrigation and/or incorporate new land into district boundaries (inclusions) or (2) substantially alter current land uses within district boundaries. Reclamation would need to consider the effects of either one of the above to historic properties for actions it approves. The measures discussed below are designed to ensure that these actions, which could affect historic properties, comply with requirements under Section 106 of the National Historic Preservation Act and other relevant federal rules and regulations.

NO-ACTION ALTERNATIVE

As indicated above, long-term water service contract renewal itself will not result in impacts to eligible or potentially eligible prehistoric or historic sites or districts within the service areas for the 20 DMC Unit contractors. Land use changes, including the addition of lands to districts or the conversion of land from agricultural to M&I use, are made at the local level, according to California land use planning law and as described further in Section 3.4, Land Use. There are no plans at the federal level to either add lands to districts or to effect land use conversions through the long-term water service contract renewal process.

It is possible that one or more of the contracted districts could petition Reclamation to expand agricultural activities served by contracted water within district lands or to substantially alter land use within the district utilizing available contracted water. Under these circumstances, Reclamation would comply with Section 106 of the National Historic Preservation Act and other rules and regulations governing effects or potential effects of new undertakings to cultural resources determined or considered potentially eligible for inclusion on the NRHP.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in impacts to eligible or potentially eligible prehistoric or historic sites or districts within the service areas for the 20 DMC Unit contractors. There are no plans at the federal level to either add lands to districts or to effect land use conversions through the long-term water service contract renewal process that could result in an impact to these resources. Therefore, Alternative 1 would not result in adverse impacts to cultural resources.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not result in impacts to eligible or potentially eligible prehistoric or historic sites or districts within the service areas for the 20 DMC Unit contractors. There are no plans at the federal level to either add lands to districts or to effect land use conversions through the long-term water service contract renewal process that could result in an impact to these resources. Therefore, Alternative 2 would not result in adverse impacts to cultural resources.

EFFECTS NOT FOUND TO BE SIGNIFICANT

To date, while archaeological and historical sites have been documented within district lands comprising the DMC Unit, continuation of current land uses is not considered adverse, and no specific mitigation measures are necessary. For substantial land use changes involving federally contracted water, the required Section 106 consultation would consider potential effects to eligible historic properties pursuant to relevant federal law, rules, and regulations.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, will not result in impacts to cultural resources. The contracts call for the delivery of the same quantities of water to the same lands, with no additional facility modifications or construction that could directly or indirectly lead to physical impacts to cultural resources.

SECTION 3.11: RECREATIONAL RESOURCES

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the recreational resources within the DMC Unit. Information in this section is summarized from the Draft CVPIA PEIS, Recreation, Technical Appendix, Volume 4 (Reclamation 1997c).

AFFECTED ENVIRONMENT

Recreation sites that could be affected by the renewal of long-term water service contract in the DMC Unit include San Luis Reservoir, the O'Neill Forebay, Pacheco State Park, the San Joaquin River, and various wildlife refuges and areas located near the DMC Unit. The Delta-Mendota Canal itself also provides limited recreational opportunities and, therefore, is treated as a potentially affected recreational area.

RESERVOIRS

San Luis Reservoir and the adjacent O'Neill Forebay provide reservoir-related recreational resources in the vicinity of the service areas of the DMC Unit contractors. The reservoirs are located west of Interstate 5 near State Route 152. They are within the San Luis Reservoir State Recreation Area, operated by the California Department of Parks and Recreation (CDPR). Visitor attendance to the San Luis Reservoir State Recreation Area in fiscal year 2001 and 2002 was 514,096 (California Department of Parks and Recreation 2004). This included 469,478 day-users and 44,618 campers.

San Luis Reservoir

When it is full, San Luis Reservoir covers approximately 12,700 surface acres. Recreational activities include boating, water-skiing, fishing, picnicking, camping, hunting, and hiking. Reservoir facilities consist of one campground and two concrete boat ramps and boarding docks. The reservoir has no designated swimming or lakeside beach areas. Boat and shore fishing occur throughout San Luis Reservoir. Migratory waterfowl hunting is permitted on most of the reservoir. Hunting for deer and wild pig is also allowed on the northwest shoreline of the San Luis Reservoir State Recreation Area.

Water-enhanced activities account for the largest portion of reservoir use. Relaxing and camping are the most popular of the water-related activities. Seventy-seven percent of annual use occurs between April and September. Recreation at the reservoir is optimized at a pool elevation 544 feet above mean sea level. Use of the two boat ramps becomes impaired between 340 and 360 feet above mean sea level. Swimming activities are

unaffected by reservoir surface water fluctuations because the reservoir has no designated swimming facilities.

San Luis Reservoir and Los Banos Creek State Recreation Area Joint General Plan and Resource Management Plan

Reclamation, in cooperation with the CDPR, is preparing draft environmental documentation for the San Luis Reservoir and Los Banos Creek State Recreation Area Joint General Plan and Resource Management Plan (Fed. Reg 68:26:6509–6510).

San Luis Reservoir is approximately five miles west of the city of Los Banos, adjacent to State Route 152, in Merced County, California. Los Banos Creek State Recreation Area is located about five miles southwest of the city of Los Banos, south of State Route 152 and just west of Interstate 5. Reclamation, the NEPA lead agency, and CDPR, the CEQA lead agency, are preparing a joint draft programmatic environmental impact statement/report, which is due in March 2005. The purpose of the general plan is to guide future development activities and management objectives at the recreation area. CDPR is preparing the general plan portion and Reclamation is developing the resource management plan of the combined document. Reclamation and CDPR are cooperating to prepare the joint plans in a consolidated planning process to solicit agency and stakeholder participation for both efforts simultaneously. The project areas for each plan will vary, based on differences in management and ownership; however, there will be common components within the joint plans.

The San Luis Reservoir and the Los Banos Creek Retention Dam were built in 1965 as part of the CVP on lands owned by Reclamation. The lands are jointly managed by DWR and CDPR. CDPR is responsible for recreation and resource management while DWR manages the water supply facilities. The CDFG manages additional tracts of land in the vicinity of the San Luis Reservoir that were set aside to mitigate for construction impacts. These DFG-managed lands will not be part of the general plan or the environmental documents because the CDPR does not have management jurisdiction over these lands. The San Luis Reservoir and O'Neill Forebay Wildlife Areas, federally owned lands managed by the CDFG, will be included in the resource management plan and the environmental documentation.

The objectives of the joint plans are to establish management objectives, guidelines, and actions to be implemented by Reclamation directly or through its recreation contract with CDPR to:

- Protect the water supply and water quality functions of the reservoirs.

- Protect and enhance natural and cultural resources in the state recreation area, consistent with federal law and Reclamation policies.

- Provide recreational opportunities and facilities consistent with the CVP purposes

The joint plans will be the primary management guideline for defining a framework for resource stewardship, interpretation, facilities, visitor use, and services. The joint plans will define an ultimate purpose, vision, and intent for management through goal statements, guidelines, and broad objectives. They will be long-term plans that will guide future specific actions at the state recreation area. Subsequent specific actions will be the subject of future environmental analysis as required.

O'Neill Forebay

The O'Neill Forebay is located immediately east of San Luis Reservoir and 2.5 miles downstream of the San Luis Dam. The O'Neill Forebay covers about 2,250 acres of surface area and 14 miles of shoreline and was developed in part to accommodate recreational use that may be lost when San Luis Reservoir is drawn down. Recreational facilities consist of two boat ramps, two picnic areas, a campground, and a swimming area. O'Neill Forebay recreational features also include the Medeiros recreation area, which provides picnicking, camping, and boat ramp access, and the San Luis Creek day-use area, which provides picnicking, swimming, and boat ramp access. Facilities accommodate boating, fishing, swimming, wading, camping, and sightseeing. In addition, the O'Neill Forebay is nationally known for windsurfing.

The recreational facilities at O'Neill Forebay provide more diverse recreational opportunities than those at San Luis Reservoir. The most popular activities are swimming, wading, and relaxing. The majority of visits occur between April and September. Visitor origins include San Luis Reservoir, including coastal and bay counties to the west, and valley and foothill counties to the east.

Recreational use at O'Neill Forebay is generally unaffected by water level fluctuations because pool elevations are usually maintained at constant levels. However, minor drops in surface elevation may affect beach use because a relatively large amount of the shoreline would be exposed.

PACHECO STATE PARK

Pacheco State Park is adjacent to the San Luis Reservoir to the west. Because Paula Fatjo, a direct descendant of Francisco Pacheco for whom Pacheco Pass is named, wanted her ranch, El Rancho San Luis Gonzaga, to be kept intact for the enjoyment of people who shared her love of horses and the beauty of the unspoiled land itself, she donated the

parklands to the State of California. Pacheco State Park has beautiful displays of spring wildflowers, scenic vistas, and excellent hiking, mountain biking, and horse trails. The 28 miles of designated trails offers several loop options to give visitors the choice of a hike or ride from one to 20 miles or more. Visitors on the park's trails can enjoy beautiful views of the San Luis Reservoir and the San Joaquin Valley and, in the spring, blossoming wildflowers. Pacheco State Park is home to tule elk, deer, bobcat, coyote, fox, hawks, eagles, and a variety of smaller animals. Among the historic features of the park are an old line shack used by Henry Miller's cattle company in the late 1800s and part of the old Butterfield stage line route.

Only the western 2,600 acres are currently open for public use. The eastern portion of the park that adjoins San Luis Reservoir remains closed to the public until additional trail systems have been developed and the safety concerns associated with a wind turbine farm can be addressed.

SAN JOAQUIN RIVER

The San Joaquin River is approximately 100 miles long and extends from Millerton Lake to the Delta. Table 3.11-1 lists some of the recreational facilities and activities located on the San Joaquin River near the DMC Unit.

Table 3.11-1
San Joaquin River Recreational Facilities and Activities near the Delta-Mendota Canal Unit

San Joaquin River Locations	Facilities and Activities
Millerton Lake to Merced County line near State Route 152	No major public recreation features; public access at several road and state highway crossings
Merced County	San Luis National Wildlife Refuge Fremont Ford State Recreation Area
Stanislaus County	Las Palmas fishing access site Laird County Park Numerous public access points
San Joaquin County	Durham Ferry State Recreation Area Mossdale Landing County Park Dos Reis County Park Numerous public road crossings

Recreational use estimates for the 100 miles of the lower San Joaquin River are not available. However, based on information provided by recreation sites on the river, boating and fishing activities are estimated to total about 157,000 six-hour recreation visitor-days (California Department of Parks and Recreation 1990). Most of the San Joaquin River visitors are assumed to originate from nearby counties.

Recreational use on the San Joaquin River has been substantially affected by operation of Millerton Lake and diversions from the Merced and Chowchilla Canals east of the Mendota Pool. The San Joaquin River flow is somewhat intermittent downstream of the Mendota Pool to the Merced River confluence, with flows fed mainly by irrigation return flows.

DELTA-MENDOTA CANAL

Fishing access to the Delta-Mendota Canal is provided at Delta-Mendota Canal Site 2A in Stanislaus County and Delta-Mendota Canal Site 5 in Fresno County. Both sites provide parking areas and restrooms (Reclamation 1992). Fishing access to the Delta-Mendota Canal is limited to the developed access points (Reclamation 1993). Fishing is the only recreational activity allowed at both access sites.

Fishing use at the two sites has been estimated at 23,000 visitor-days (Reclamation 1997c). Canal Site 5 accounted for approximately 99 percent of this total in 1991. An estimated 85 percent of the visitors to the fishing sites originate in the local area (Reclamation 1981). Because no water-contact activities are allowed on the canal, fluctuations in the water level or flow do not directly affect recreational opportunities.

WILDLIFE REFUGES

Wildlife refuges in the vicinity of the Delta-Mendota Canal service area include the San Luis and Kesterson National Wildlife Refuges; the Mendota, Merced, San Luis National, San Joaquin National, Volta, Los Banos, and North Grasslands (Salt Slough and China Island) Wildlife Management Areas; Upper and Lower Cottonwood Wildlife Areas; Action Plan Lands (Freitis and West Bear Creek); and the Grassland Resource Conservation District. The Wildlife Management Areas listed above are discussed in more detail in Section 3.9, Biological Resources.

PRIVATE HUNTING CLUBS

The 176 private waterfowl hunting clubs in the San Joaquin River Region cover about 96,800 acres. About 33,900 acres are flooded annually. Waterfowl hunting activity was estimated at 241,000 hunter-days in 1992.

ENVIRONMENTAL CONSEQUENCES

Impacts to recreational resources would be considered adverse if they result in a decline in the quality or quantity of recreational facilities or services, exceed adopted state or local recreation planning standards, or involve the installation of new facilities that could adversely impact the recreational environment.

NO-ACTION ALTERNATIVE

San Luis Reservoir could be affected by water level fluctuations during one or more dry or wet years. Boating would be constrained and shoreline activities would decline for two or more peak-season months as compared to the Affected Environment. During consecutive wet years, boat ramps would be unusable for one more peak-season month, boating would

be constrained, and shoreline activities would decline for two more peak-season months and one more off-season month. Additional use could decrease about 1 percent during dry years and about 4 percent during wet years.

Because pool elevations in O'Neill Forebay are maintained at constant levels, water level fluctuations would not be affected. Increased stream flows on the San Joaquin River could increase recreational opportunities. Recreational opportunities provided by the Delta-Mendota Canal are expected to be similar to No-Action Alternative conditions because water levels in the canal are held constant. Wildlife refuges will receive increased water supplies as a result of Level 2 refuge water supplies, thereby maintaining refuge recreational opportunities at current or enhanced levels, especially for wildlife observation activities.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in adverse impacts on recreational resources. The facilities would continue to operate as in the past. Recreational opportunities and annual use levels at the O'Neill Forebay, San Joaquin River, Delta-Mendota Canal, and wildlife refuges are not expected to change from current conditions as a result of long-term contract renewals.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not result in adverse impacts on recreational resources. The facilities would continue to operate as in the past. Recreational opportunities and annual use levels at the O'Neill Forebay, San Joaquin River, Delta-Mendota Canal, and wildlife refuges are not expected to change from current conditions as a result of long-term contract renewals.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, will not cause or contribute to impacts to recreational opportunities or resources. Contract renewals call for the same quantities of water to be delivered to the same lands, with no additional facility modifications or construction. Water storage and conveyance facilities that provide recreational opportunities will not be incrementally affected by long-term contract renewals; reductions in water surface elevations are attributable to other operational decisions independent of the renewal of long-term water service and repayment contracts.

SECTION 3.12: VISUAL RESOURCES

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on the visual resources in the DMC Unit. Information in this section is summarized from the Draft CVPIA PEIS, Visual Resources, Technical Appendix, Volume 6 (Reclamation 1997e).

AFFECTED ENVIRONMENT

The San Joaquin River Region is lowland with predominantly flat and gently sloping terrain bordered by hills and low mountains. The valley is semi-arid to arid, and there are few natural lakes or perennial streams. The San Joaquin River is the principal water feature. A number of wetlands used as wildlife refuges are also located in the region. The valley area is developed predominantly for agricultural uses. It is sparsely to moderately populated, having one large urban area (metropolitan Fresno) and scattered small communities. The northern area of the region near the city of Tracy is developing rapidly.

There are CVP facilities within and in the vicinity of the DMC Unit that are visual resources. They include the San Luis Reservoir and O'Neill Forebay within the Los Banos Creek State Recreation Area. The landscape in this area is considered common scenic to minimal scenic quality. Recreational sites are discussed in further detail in Section 3.11, Recreational Resources.

The area surrounding the DMC Unit is predominantly of minimal scenic quality, with some areas of common scenic quality (U.S. Forest Service 1976). Interstate 5 provides panoramic view opportunities in some of the DMC Unit, some segments of which are designated scenic highways. Views of the Delta-Mendota Canal and California Aqueduct are the basis for the designation of Interstate 5 as a scenic highway. Similarly, views of San Luis Reservoir are important reasons for State Route 152 being designated a scenic highway.

Wildlife refuges in the region near the DMC Unit project area are considered to have landscape variety that ranges from common scenic to distinctive scenic quality (U.S. Forest Service 1976). These areas provide visual contrast with surrounding agricultural lands primarily because of their vegetation and water. The scenic quality is enhanced seasonally by the large numbers and variety of waterfowl and seasonal wildflower displays, which attract substantial visitation, thereby increasing the viewer sensitivity of the area. The CVP, through its wildlife refuges, creates visual benefits.

ENVIRONMENTAL CONSEQUENCES

A visual resource impact would be considered adverse if it interfered with existing scenic views, blocked visibility, or produced light and glare inconsistent with existing areas. Impacts in the DMC Unit project area depend on (1) changes in cropping patterns, which may result in increased fallowed land and the associated modified agricultural viewshed, and (2) releases from storage reservoirs, which may result in a "bathtub ring" effect caused by the appearance of unvegetated soil at the shoreline between the water surface and the high water line.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, irrigated acreage would be reduced by only a small amount (see Section 3.2, Agriculture). The visual character of lands irrigated in the past for agricultural purposes would not be substantially altered. Because of the combined use of surface and groundwater, the general cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural viewsheds would not substantially change. Neither scenic views nor visibility would be adversely impacted. Therefore, the No-Action Alternative would not adversely impact visual resources.

If San Luis Reservoir is operated to increase end-of-month storage in September, the occurrence of the present "bathtub ring" effect would be beneficially reduced as compared to the Affected Environment, particularly during the summer months when the reservoir experiences substantial use.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in adverse impacts on visual resources. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural viewsheds would not change. Neither scenic views nor visibility would be adversely impacted.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not result in adverse impacts on visual resources. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural viewsheds would not change. Neither scenic views nor visibility would be adversely impacted.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, would not affect visual resources in the DMC Unit. Long-term

contract renewals will obligate delivery of the same quantities of water to the same lands, without additional facility modifications or construction that could affect viewsheds in the study area. Other reasonably foreseeable future actions that could affect water surface elevations, the visual quality of current rural and agricultural viewsheds, the conversion of lands to other developed uses, and other independent CVP operational and land use decisions will occur to the same degree regardless of long-term contract renewals, and, therefore, the action of renewing long-term contracts would not cumulatively add to these impacts arising independently.

SECTION 3.13: PUBLIC HEALTH

This section discusses the potential effects that the alternatives considered in Chapter 2 would have on public health within the DMC Unit. Information in this section was summarized primarily from the Final CVPIA PEIS (Reclamation and Service 1999).

AFFECTED ENVIRONMENT

In addition to being persistent pests, mosquitoes can carry various strains of diseases known as arboviruses (or, more specifically, encephalitis). They are also known to transmit malaria (a parasitic blood disease) to humans and heartworms (a parasite) to dogs. Because the viruses often go unreported until patients develop acute symptoms, the prevalence of the viruses is also subsequently underreported. According to the CVPIA PEIS, outbreaks have been reported in the San Joaquin Region (Reclamation and Service 1999).

Any environment in which water is allowed to stand in shallow areas can serve as breeding ground for mosquitoes. These environments include wetlands, wildlife refuges, pastures, streams, canals, reservoirs, and other areas where water is relatively still. The main features near the project area that carry water include the San Joaquin River, Delta-Mendota Canal, and Mendota Pool. Some of these features could provide breeding grounds for mosquitoes. Also, sloughs and wildlife refuges that are near the project area typically serve as mosquito breeding grounds.

The major project features either within or near the project area with the greatest likelihood of attracting mosquito populations include the San Joaquin River, Delta-Mendota Canal, and Mendota Pool. A higher potential for breeding would occur in standing water near the San Joaquin River, which is a natural channel, and the Mendota Pool, which serves a reservoir. It is expected that mosquito breeding would be less or nonexistent along the Delta-Mendota Canal because the water typically flows swiftly as it is distributed throughout the Central Valley. Open canals and ditches associated with contractors' distribution systems and the reuse of tailwater could provide breeding ground for mosquitoes.

The majority of the 20 DMC Unit contractors have distribution systems to transport their CVP water supply. These distribution systems generally consist of varying lengths of lined and unlined canals, lift stations, underground pipelines, and open ditches. Much of these systems are gravity-fed, open canals. Also, as discussed in Section 3.1, Contractor Service Area Descriptions, many of the contractors within the DMC Unit reuse drainage or tailwater to eliminate offsite drainage. This tailwater is most often transported through

unlined ditches and returned onto a field for irrigation or into a district's distribution system for reuse. The moving water does not serve as a breeding area for mosquitoes.

Local mosquito control agencies have been developed to control mosquitoes and other vectors in an effort to control epidemics of human encephalitis and malaria. The mosquito abatement districts and control agencies adapt their practices in response to hydrologic conditions and the extent of areas supporting appropriate breeding habitat (Reclamation and Service 1999).

ENVIRONMENTAL CONSEQUENCES

NO-ACTION ALTERNATIVE

As described in Chapter 2, the No-Action Alternative provides baseline conditions for comparing the action alternatives and represents future conditions at a projected level of development without the implementation of any action alternative.

The implementation of the No-Action Alternative is not expected to increase flows or the incidence of standing water in project features and, therefore, would not result in an increase in mosquito populations above those already in existence. Because no direct increase in mosquito populations is anticipated, it is assumed that CVP contractors will continue to implement local vector abatement programs to control mosquito breeding conditions and protect public health. One practice that would continue is the removal of aquatic weeds from open ditches and canals. Areas with heavy aquatic weed growth can contribute to creating an environment attractive to mosquitoes. The majority of the 20 DMC Unit contractors remove aquatic weeds by applying chemical herbicides. Other contractors use mechanical practices to remove weeds from canals.

The implementation of tiered pricing under this alternative could result in contractors seeking alternative, more affordable water supply sources. As a result, groundwater pumping and water transfers could increase. Increased groundwater pumping is not expected to directly contribute to an increase in the mosquito population, because the facilities used to pump and distribute groundwater are primarily underground and would not result in standing water.

Increased water transfers are also not expected to directly contribute to an increase in the mosquito population. It is assumed that no additional distribution facilities or expansions of any facilities would be constructed as a result of long-term water service contract renewals. It can be assumed that water will be transferred through the current distribution facilities and will not expand the mosquito population.

As the quantities of CVP water deliveries are decreased, the environment contributing to mosquito breeding will also correspondingly decrease to the extent that standing water is decreased.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not directly result in an increase in mosquito populations or have an adverse impact on public health. The implementation of Alternative 1 is not expected to increase flows or the incidence of standing water in project features and, therefore, would not result in an increase in mosquito populations.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not directly result in an increase in mosquito populations or have an adverse impact on public health. The implementation of Alternative 2 is not expected to increase flows or the incidence of standing water in project features and, therefore, would not result in an increase in mosquito populations.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, would not incrementally increase the incidence of standing water or increase mosquito breeding conditions beyond conditions already existing under current delivery quantities and storage and conveyance management and operations. Long-term contract renewals will obligate delivery of the same quantities of water to the same lands, without additional facility modifications or construction that could affect public health conditions in the study area.

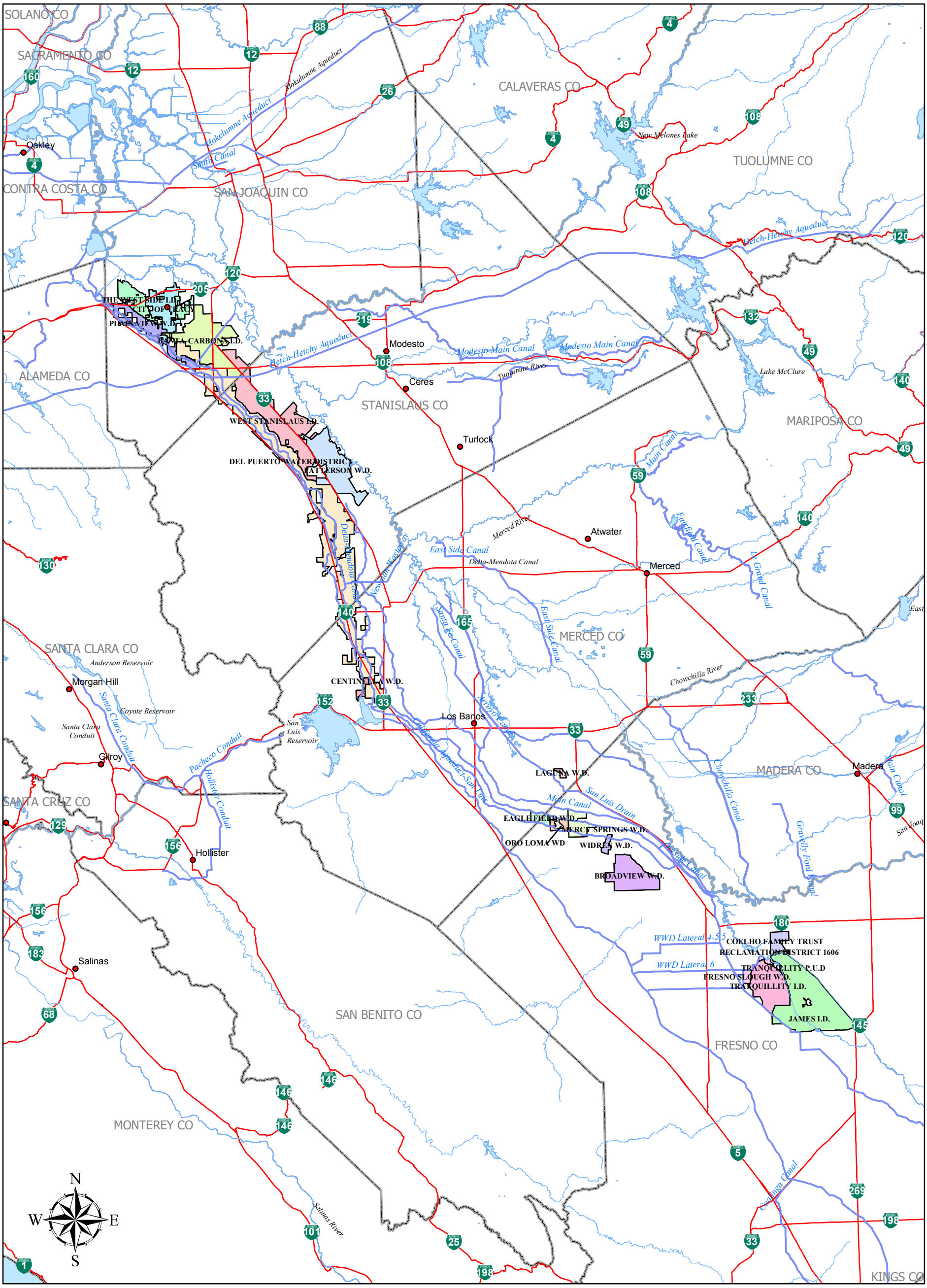


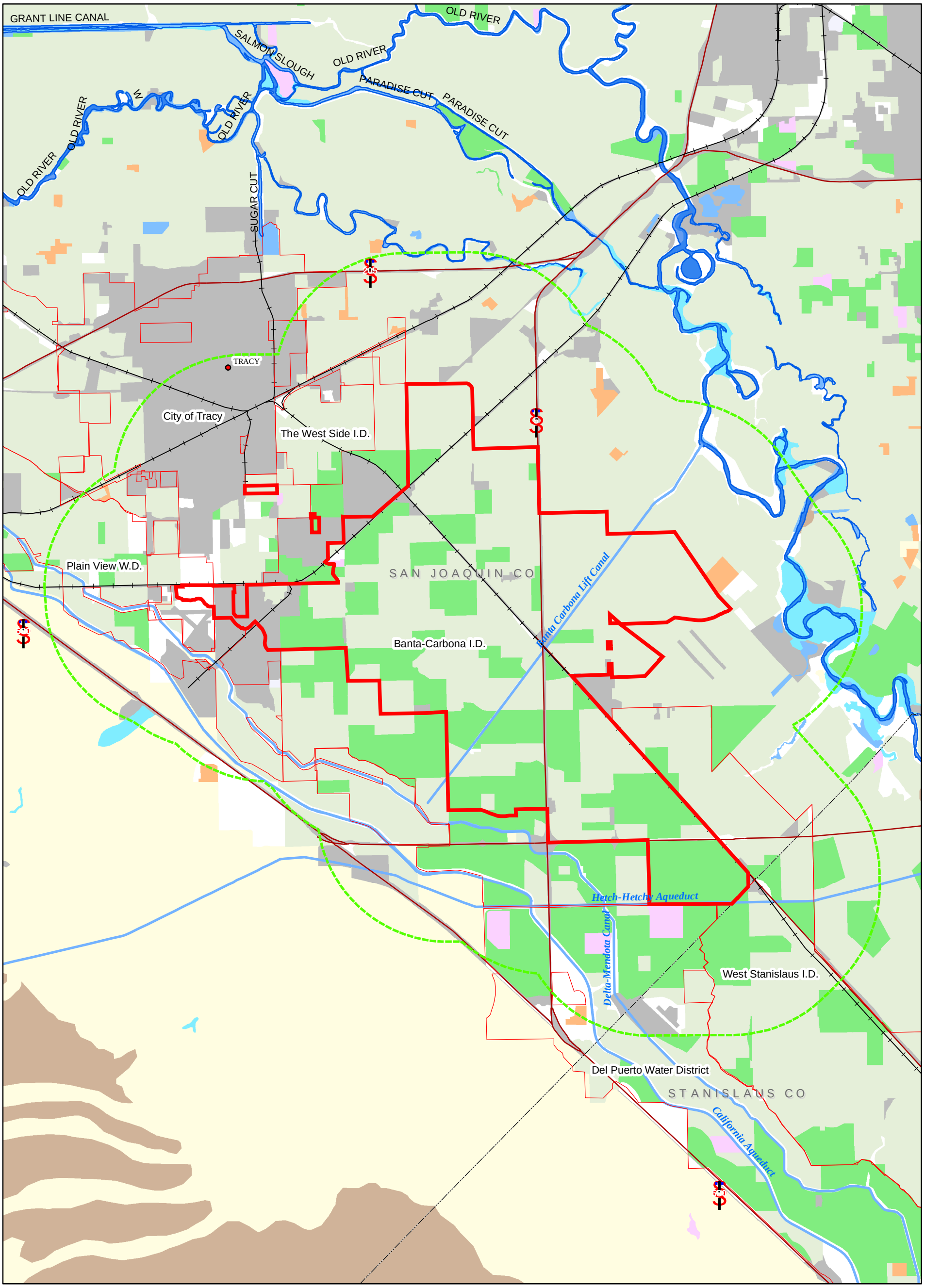
Figure 3.1-1 Long Term Contract Renewal: Central Valley Project, Delta Mendota Canal Unit

Miles

0 5 10 20 30 40

Wednesday, February 23, 2005 9:46:06 AM
\\ibr2frogis\K_fro_giswork\serysian\projects\long_term_contracts\DMC\basemap_rev.mxd

DISCLAIMER
This map is intended to be a graphical representation only.
It is not a legal document and is not intended to be used as such.
The Bureau of Reclamation gives no guarantee,
expressed or implied, as to the accuracy or reliability of the data.



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-2 Banta Carbona Irrigation District
Current Land Use/Land Cover

Legend

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer
- Banta Carbona ID

0 1 2 4 Miles

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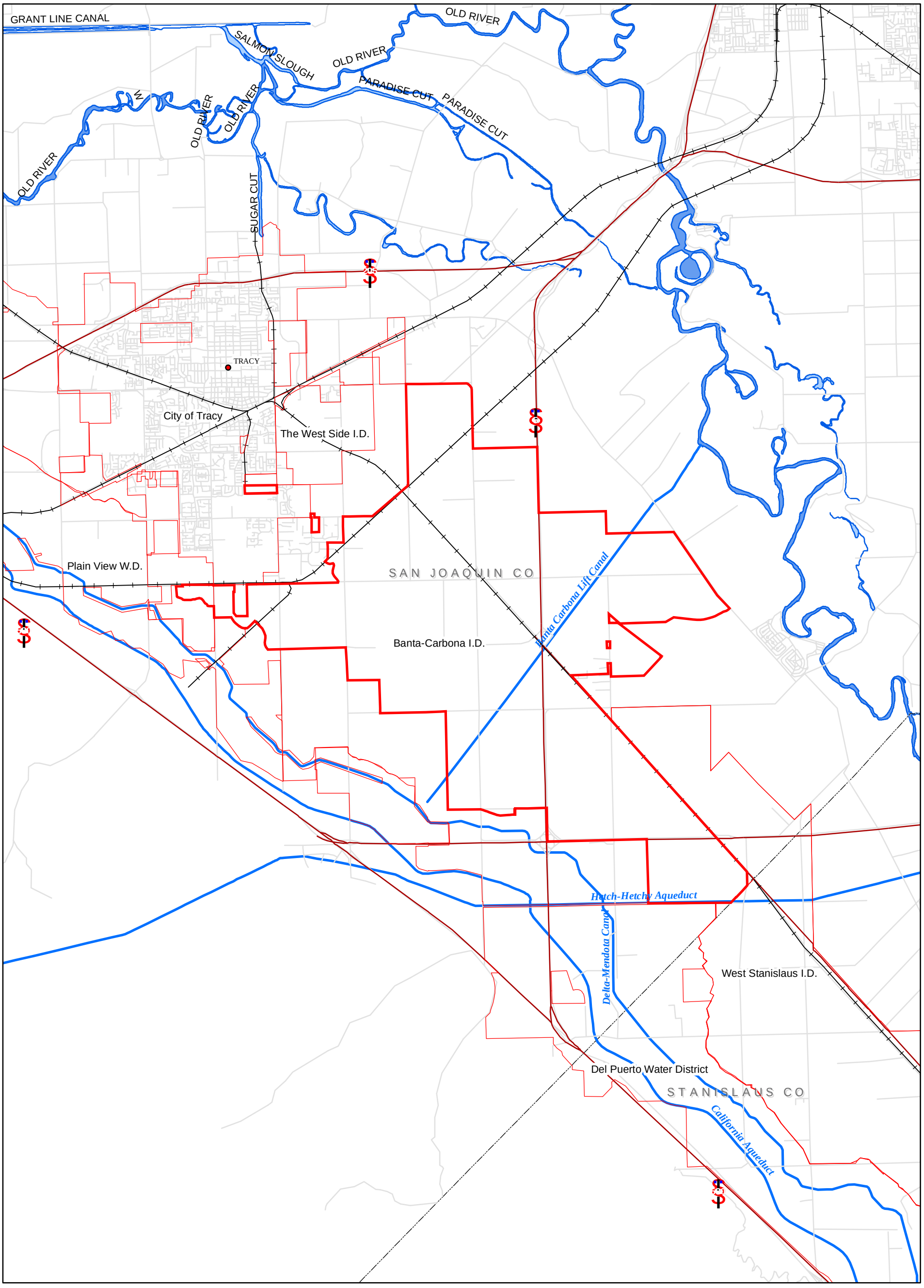
214-202-24



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-3 Banta Carbona Irrigation District Boundary

Legend

District Boundary/Contractor's Service Area

Miles

0 1.25 2.5 5

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214-202-25

San Luis Drain

Main Canal

33

MADERA CO

Mercy Springs W.D.

Widren W.D.

Delta-Mendota Canal

Outside Canal

Firebaugh Wastewtr

FRESNO CO

Broadview W.D.

PANOCHE CREEK

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-4 Broadview Water District Land Use/Land Cover

Legend

- 2 mile buffer
- Broadview WD

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Miles

0 1 2 4

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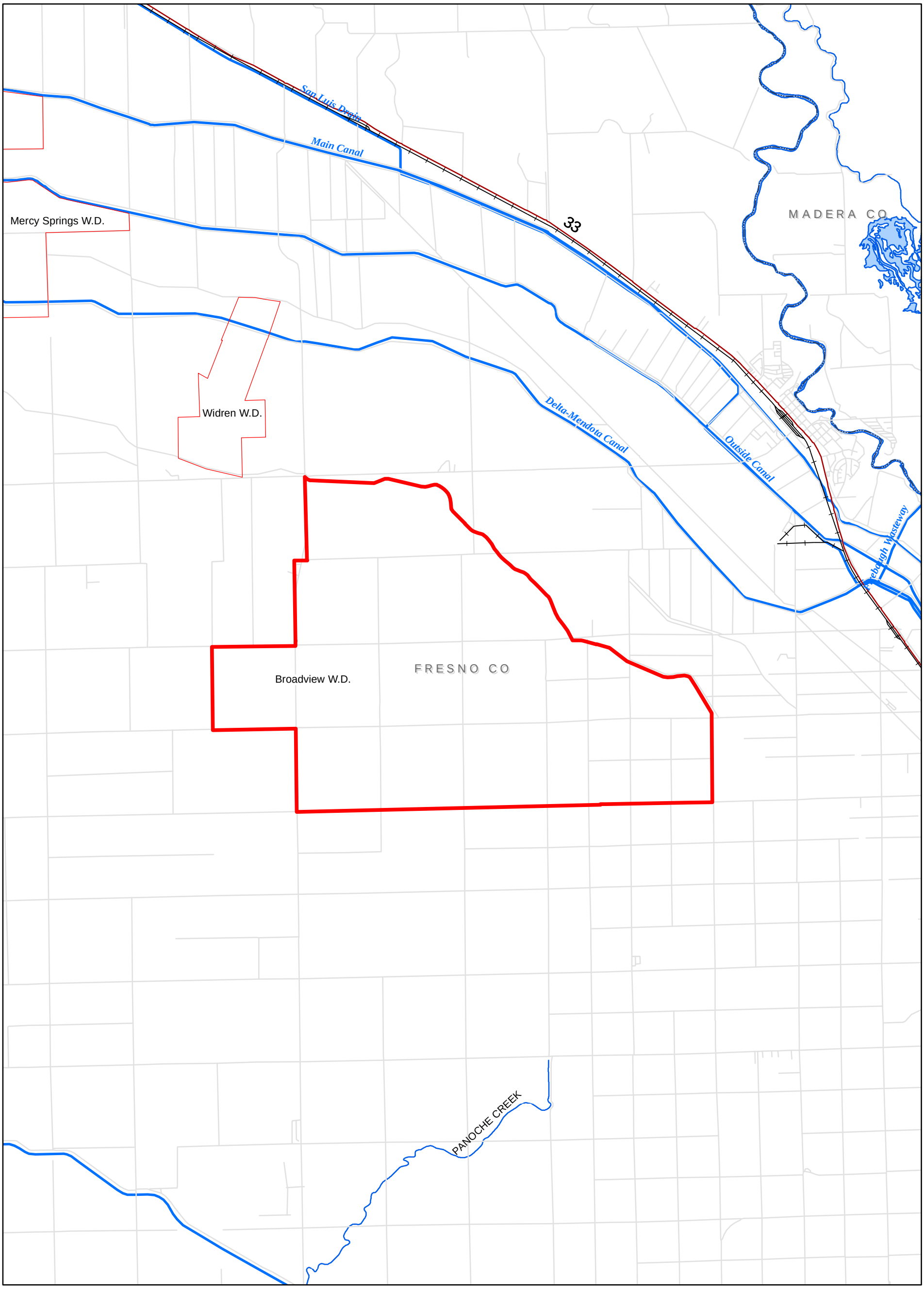

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-5 Broadview Water District Boundary

Legend

District Boundary/Contractor's Service Area

Miles

0 1 2 4

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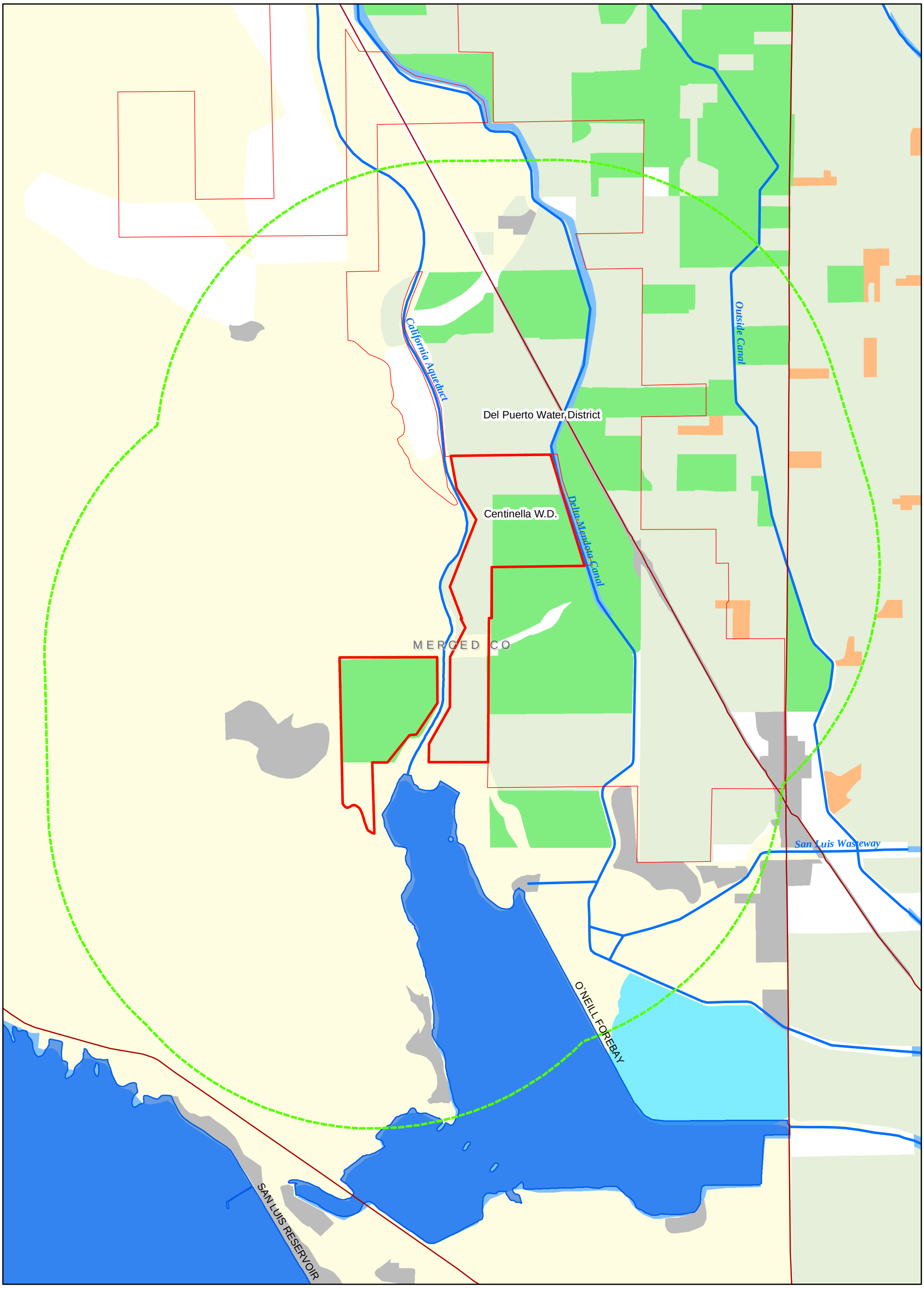

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-6 Centinella Water District Current Land Use/Land Cover

Legend

- Centinella WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Miles: 0 0.5 1 2

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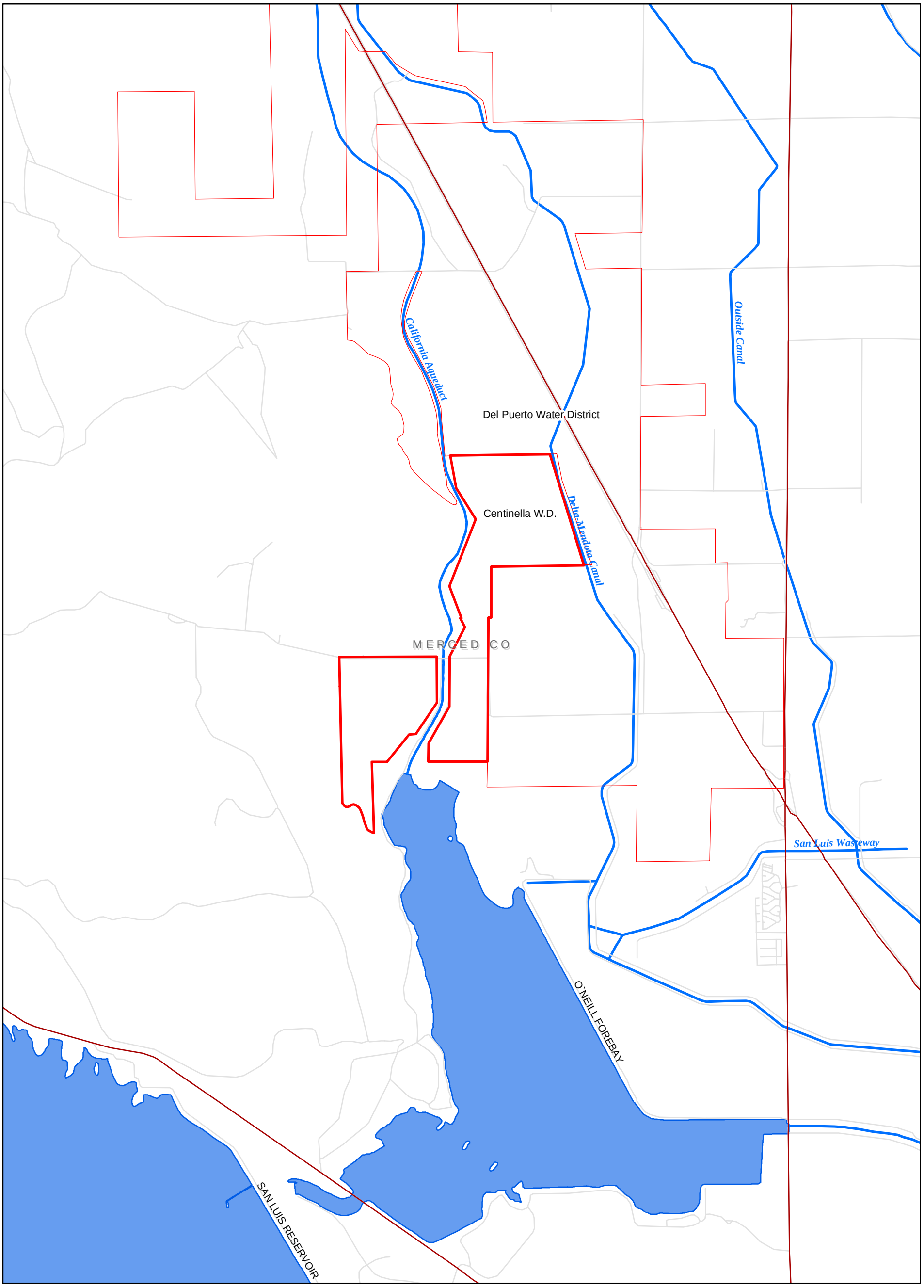

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-7 Centinella Water District Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

214-202-29

GRANT LINE CANAL
FABIAN AND BELL CANAL
SALMON SLOUGH
OLD RIVER
OLD RIVER
OLD RIVER
OLD RIVER
PARADISE CUT
PARADISE CUT
OLD RIVER
OLD RIVER
OLD RIVER
OLD RIVER
SUGAR CUT
The West Side I.D.
TRACY
City of Tracy
SAN JOAQUIN CO
Plain View W.D.
Banta-Carbona I.D.
California Aqueduct
Delta-Mendota Canal
Banta Carbona Lift Canal
Del Puerto Water District
Hetch-Hetchy Aqueduct

Legend

- City of Tracy
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-8 City of Tracy Current Land Use/Land Cover

Miles
0 1 2 4

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GRANT LINE CANAL
FABIAN AND BELL CANAL
SALMON SLOUGH
OLD RIVER
OLD RIVER
OLD RIVER
PARADISE CUT
PARADISE CUT
OLD RIVER
OLD RIVER
OLD RIVER
OLD RIVER
OLD RIVER
SUGAR CUT
The West Side I.D.
TRACY
City of Tracy
SAN JOAQUIN CO
Plain View W.D.
Banta-Carbona I.D.
California Aqueduct
Delta-Mendota Canal
Del Puerto Water District
Banta Carbona Lift Canal
Hetch-Hetchy Aqueduct

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-9 City of Tracy Boundary

0 1 2 4 Miles

Legend

District Boundary/Contractor's Service Area

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214-202-31

MADERA CO

MADERA CO

MADERA CO

181

Coelho Family Trust

FRESNO CO

Reclamation District 1606

FRESNO SLOUGH

JAMES BYPASS

Fresno Slough W.D.

Inlet Canal

James I.D.

Tranquillity P.U.D. (M. Hughes)

Tranquillity I.D.

Legend

- Coelho Family Trust
- 2 mile buffer

Land Use/Land Cover

Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-10 Coehlo Family Trust Current Land Use/Land Cover

0 0.5 1 2 Miles

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MADERA CO

MADERA CO

MADERA CO

180

Coelho Family Trust

FRESNO CO

Reclamation District 1606

FRESNO SLOUGH

JAMES BYPASS

Fresno Slough W.D.

Inlet Canal

James I.D.

Tranquillity P.U.D. (M. Hughes)

Tranquillity I.D.

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-11 Coehlo Family Trust District Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

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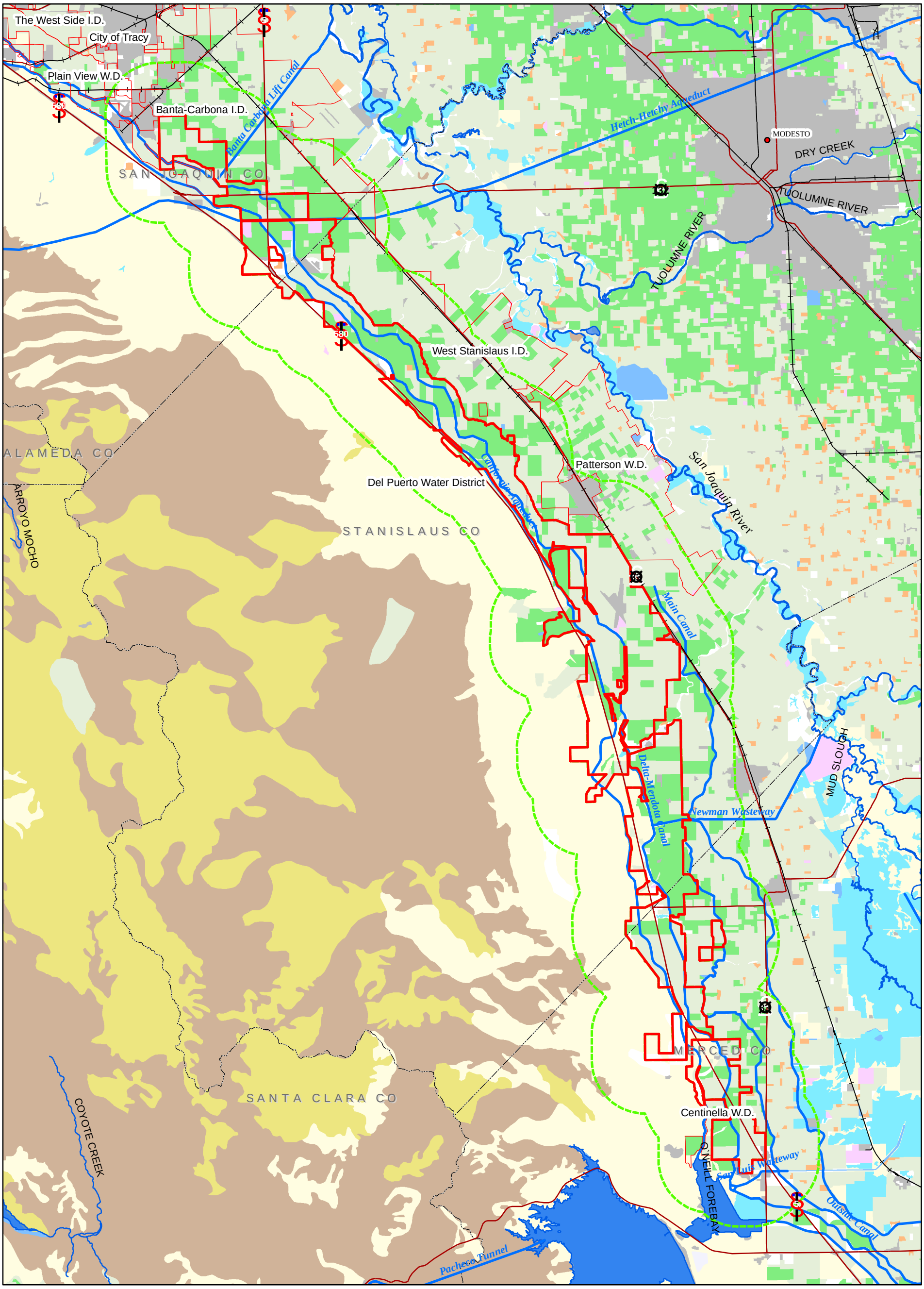
The West Side I.D.
City of Tracy
Plain View W.D.
Banta-Carbona I.D.
Banta Carbona Lift Canal
Hetch-Hetchy Aqueduct
MODESTO
DRY CREEK
TUOLUMNE RIVER
TUOLUMNE RIVER
SAN JOAQUIN CO
West Stanislaus I.D.
ALAMEDA CO
ARROYO MOCHO
Del Puerto Water District
Patterson W.D.
San Joaquin River
Main Canal
Delta-Mendota Canal
Newman Wasteway
MUD SLOUGH
STANISLAUS CO
MERCED CO
SANTA CLARA CO
COYOTE CREEK
Centinella W.D.
O'NEILL FOREBAY
San Luis Wasteway
Outside Canal
Pacheco Tunnel
Del Puerto WD
2 mile buffer
Land Use/Land Cover
Classification
Urban
Cropland and pasture
Orchards and vinyards
Confined feeding operations
Idle or retired farmland
Legend
Ruderal or unclassified rangeland
Herbaceous Rangeland
Shrub and brush or mixed rangeland
Forested land
Water
Wetland/riparian
Barren
Delta Mendota Canal Unit Water Contractor Boundaries
Figure 3.1-12 Del Puerto Water District
Current Land Use/Land Cover
Miles
0
3
6
12
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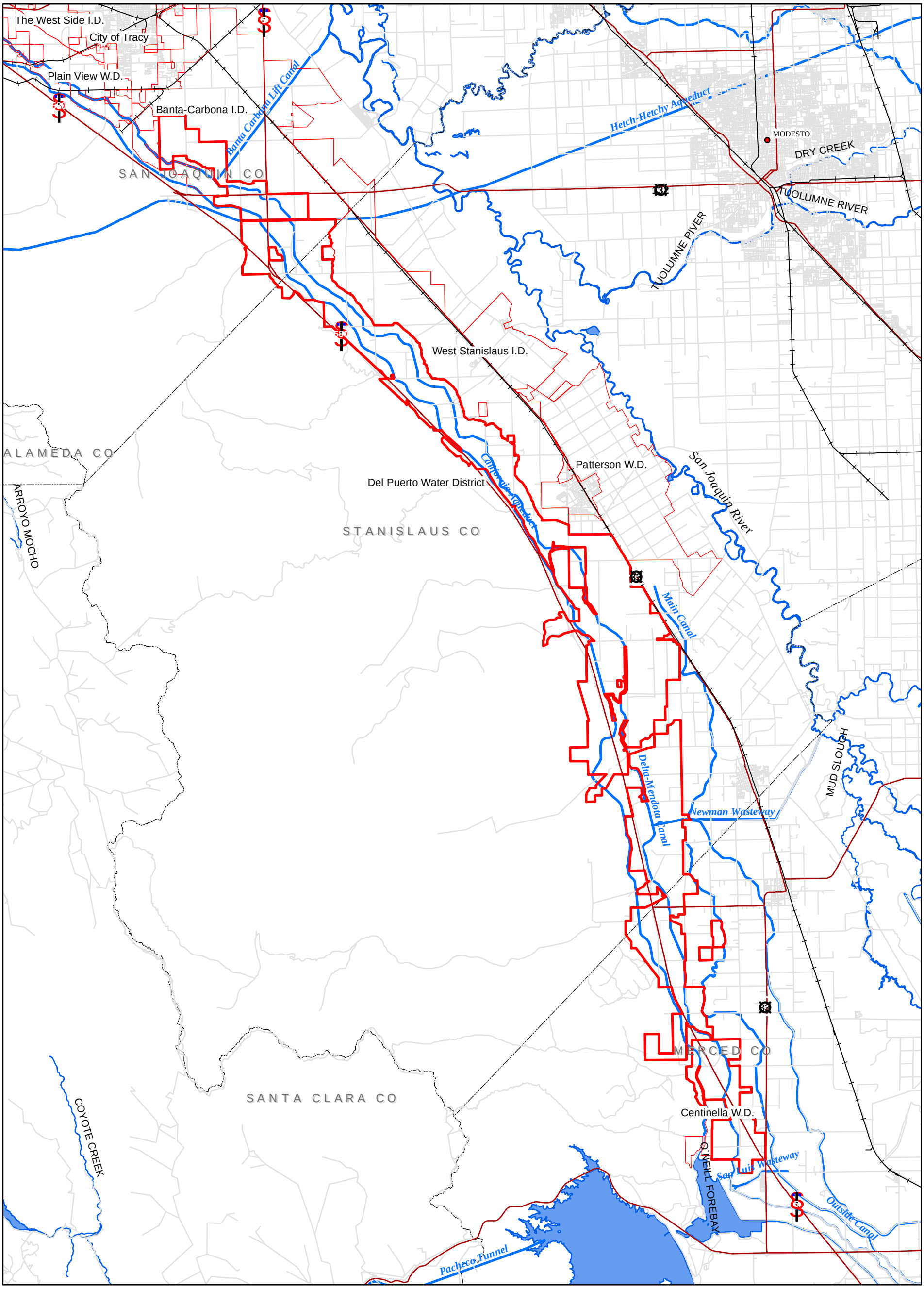


Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-13 Del Puerto Water District Boundary

Legend

District Boundary/Contractor's Service Area

Miles

0 3 6 12

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-35

Laguna W.D.

San Luis Drain

MERCED CO

Main Canal

Outside Canal

Eagle Field W.D.

Mercy Springs W.D.

Oro Loma W.D.

Delta-Mendota Canal

FRESNO CO

Legend

- Eagle Field WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-14 Eagle Field Water District Current Land Use/Land Cover

Miles

0 0.5 1 2

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-36

Laguna W.D.

San Luis Drain

MERCED CO

Main Canal

Outside Canal

Eagle Field W.D.

Mercy Springs W.D.

Oro Loma W.D.

Delta-Mendota Canal

FRESNO CO

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-15 Eagle Field Water District Boundary

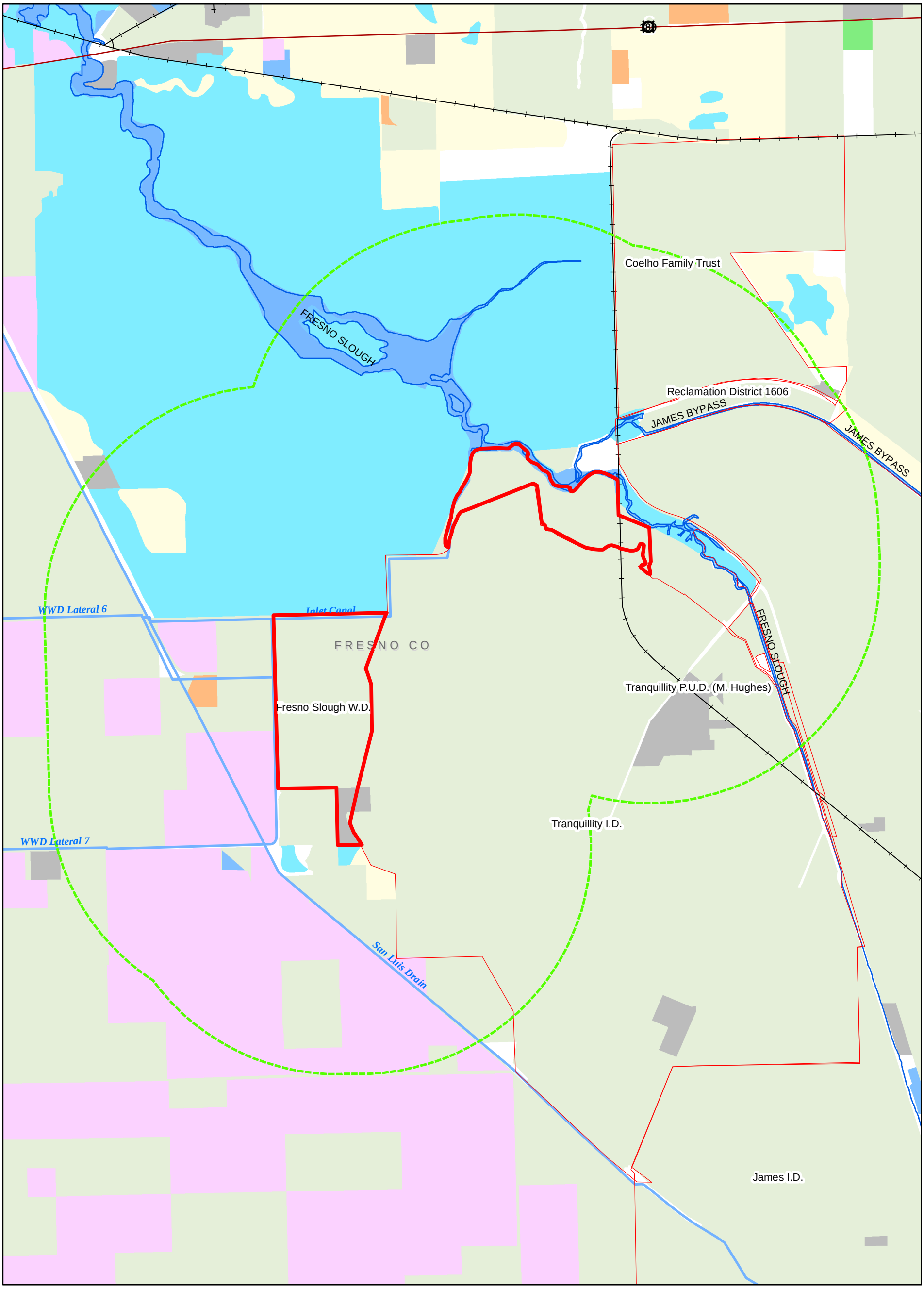
Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-37



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-16 Fresno Slough Water District
Current Land Use/Land Cover

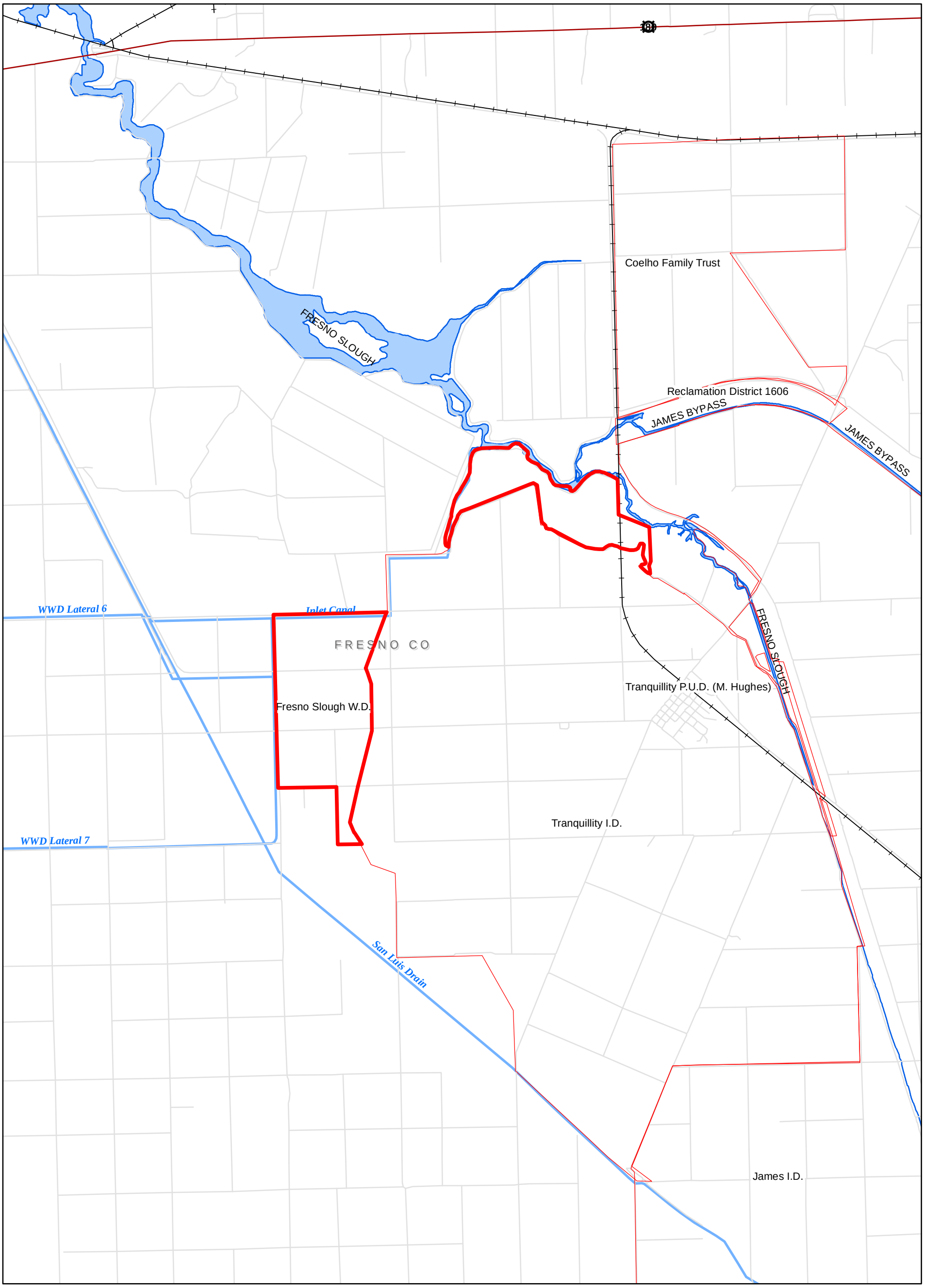
Legend

- Fresno Sough WD
- **Land Use/Land Cover Classification**
- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-38



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-17 Fresno Slough Water District Boundary

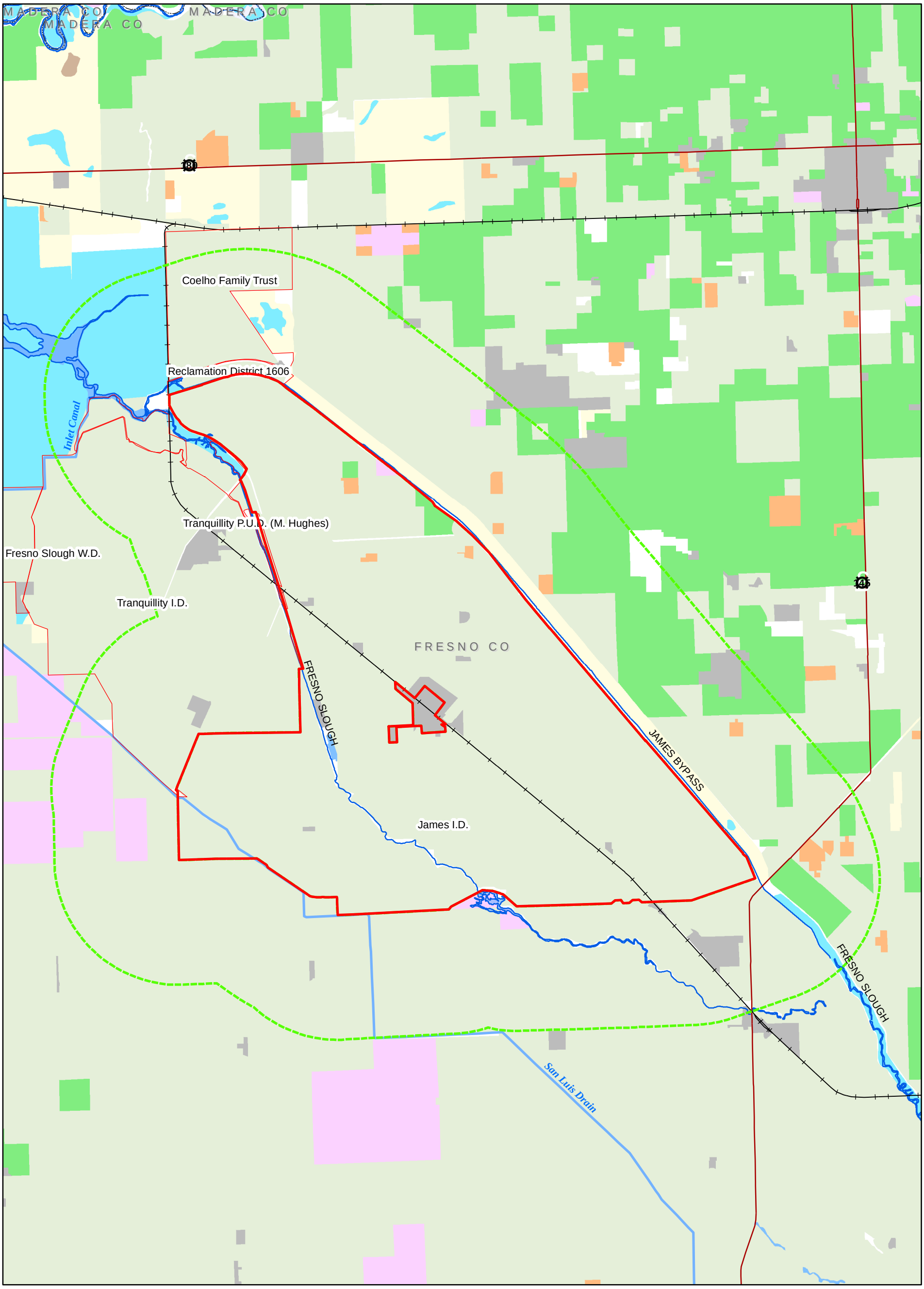
Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-39



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-18 James Irrigation District
Current Land Use/Land Cover

Legend

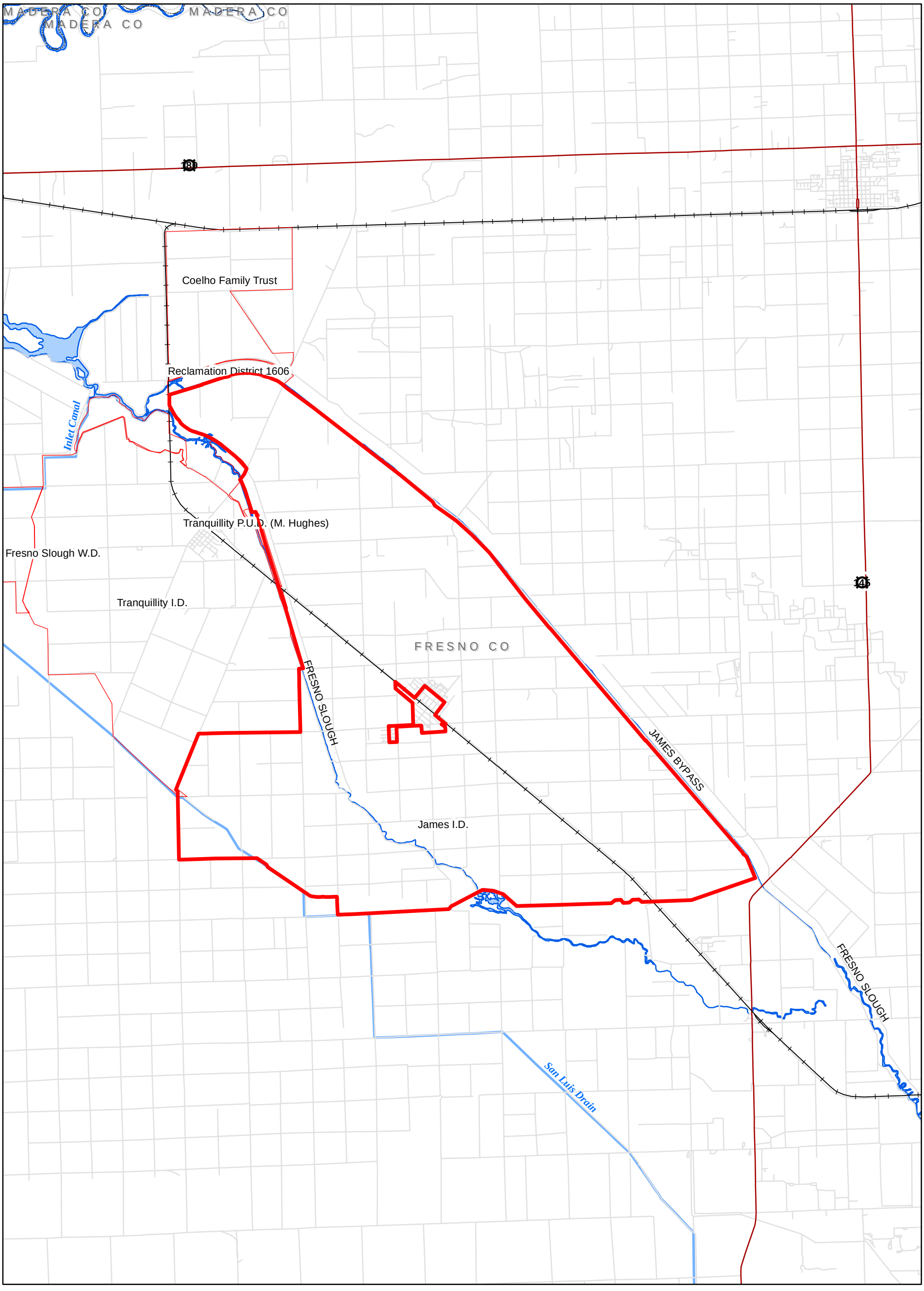
Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer

0 1.25 2.5 5 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-40



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-19 James Irrigation District Boundary

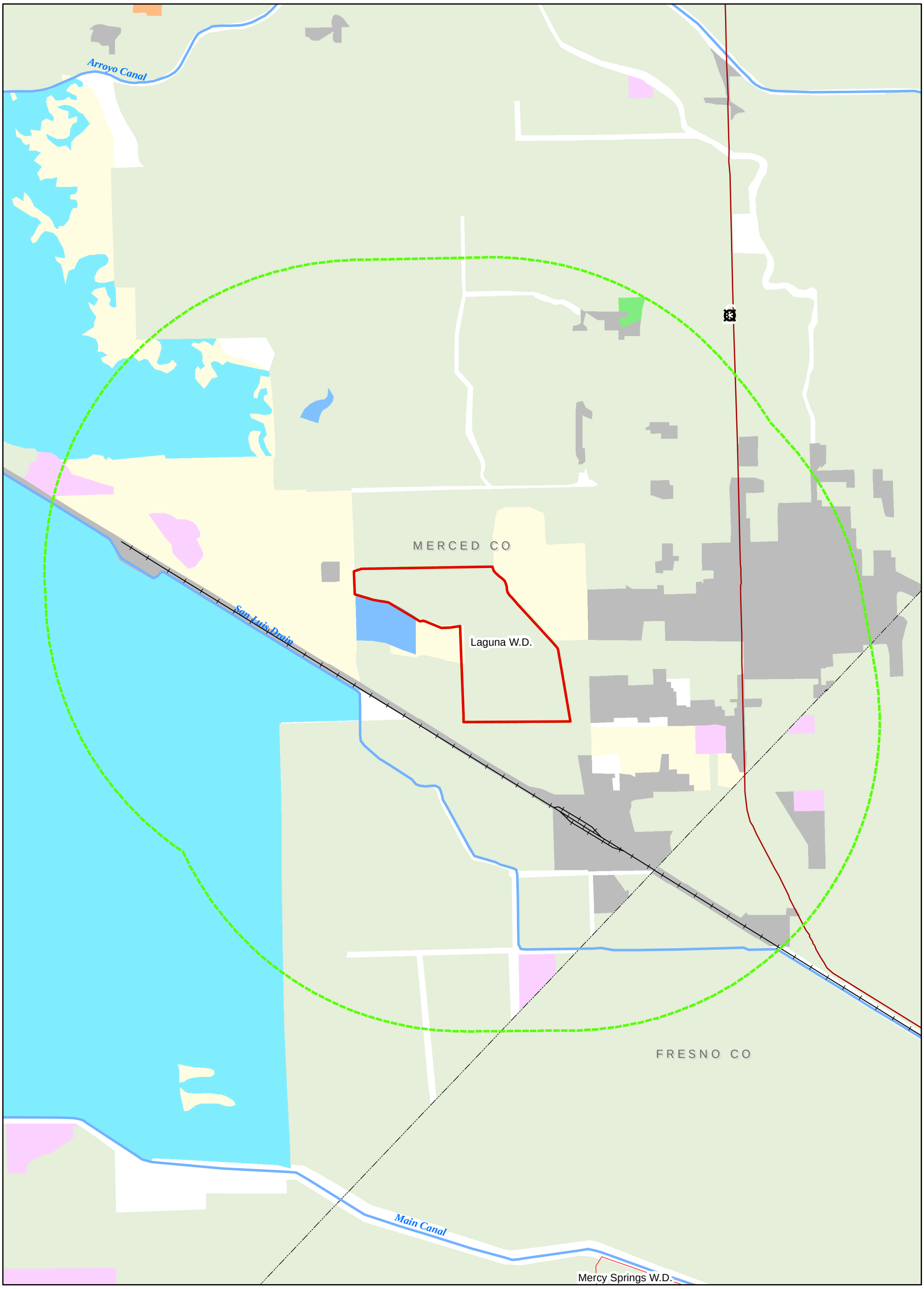
Legend

District Boundary/Contractor's Service Area

0 1.25 2.5 5 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-41



Legend

- Laguna WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

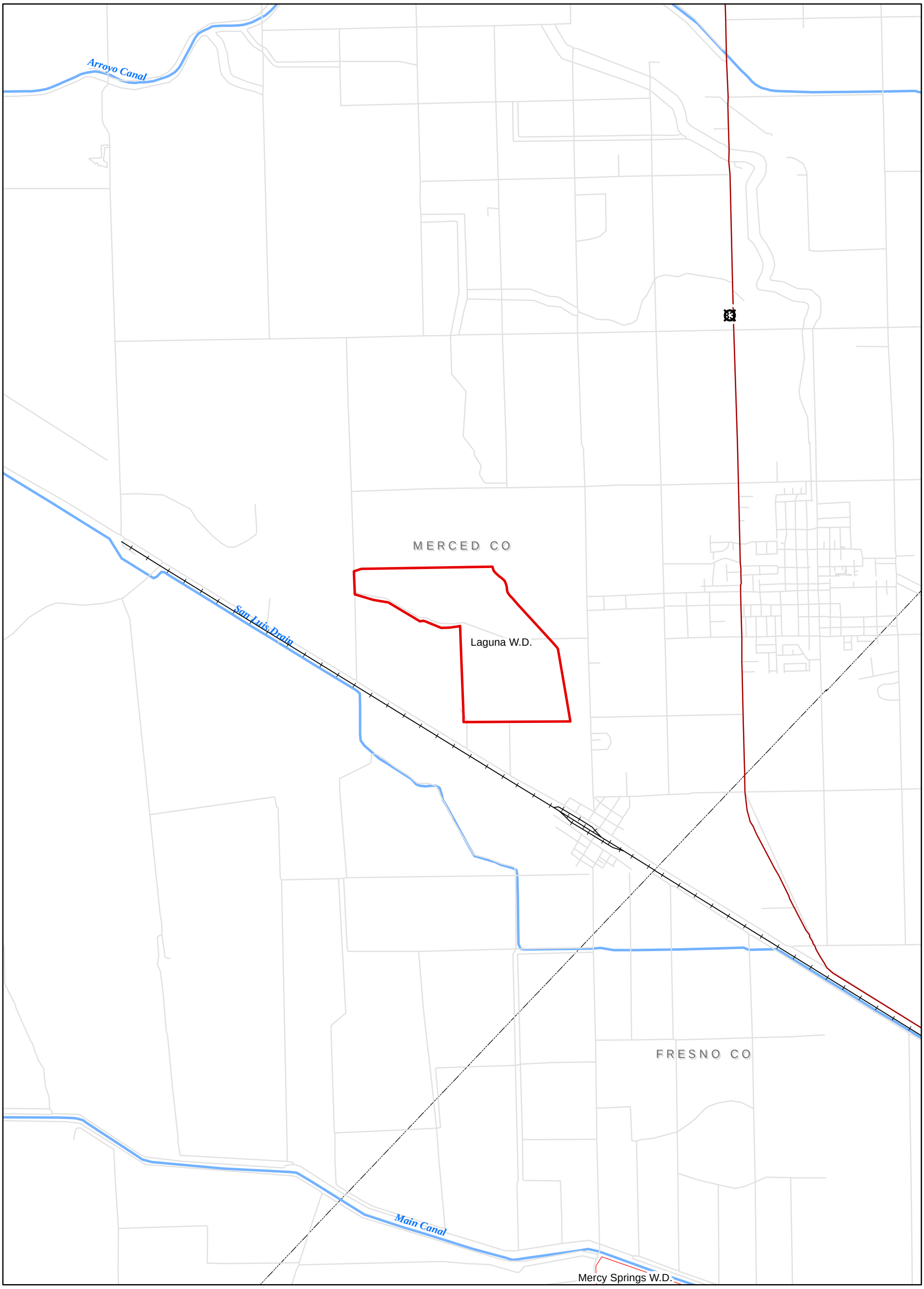
Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-20 Laguna Water District Current Land Use/Land Cover

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-42



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-21 Laguna Water District Boundary

Miles

0 0.5 1 2

Legend

District Boundary/Contractor's Service Area

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-43

Laguna W.D.

MERCED CO

San Luis Drain

Main Canal

Eagle Field W.D.

Oro Loma W.D.

Outside Canal

FRESNO CO

Mercy Springs W.D.

Delta-Mendota Canal

Widren W.D.

Broadview W.D.

Legend

- Mercy Springs WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-22 Mercy Springs Water District Current Land Use

Miles

0 0.5 1 2

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-45

Laguna W.D.

MERCED CO

San Luis Drain

Main Canal

Eagle Field W.D.

Oro Loma W.D.

Outside Canal

FRESNO CO

Mercy Springs W.D.

Delta-Mendota Canal

Widren W.D.

Broadview W.D.

Delta Mendota Canal Unit Water Contractor Boundaries
Figure 3.1-23 Mercy Springs Water District Boundary

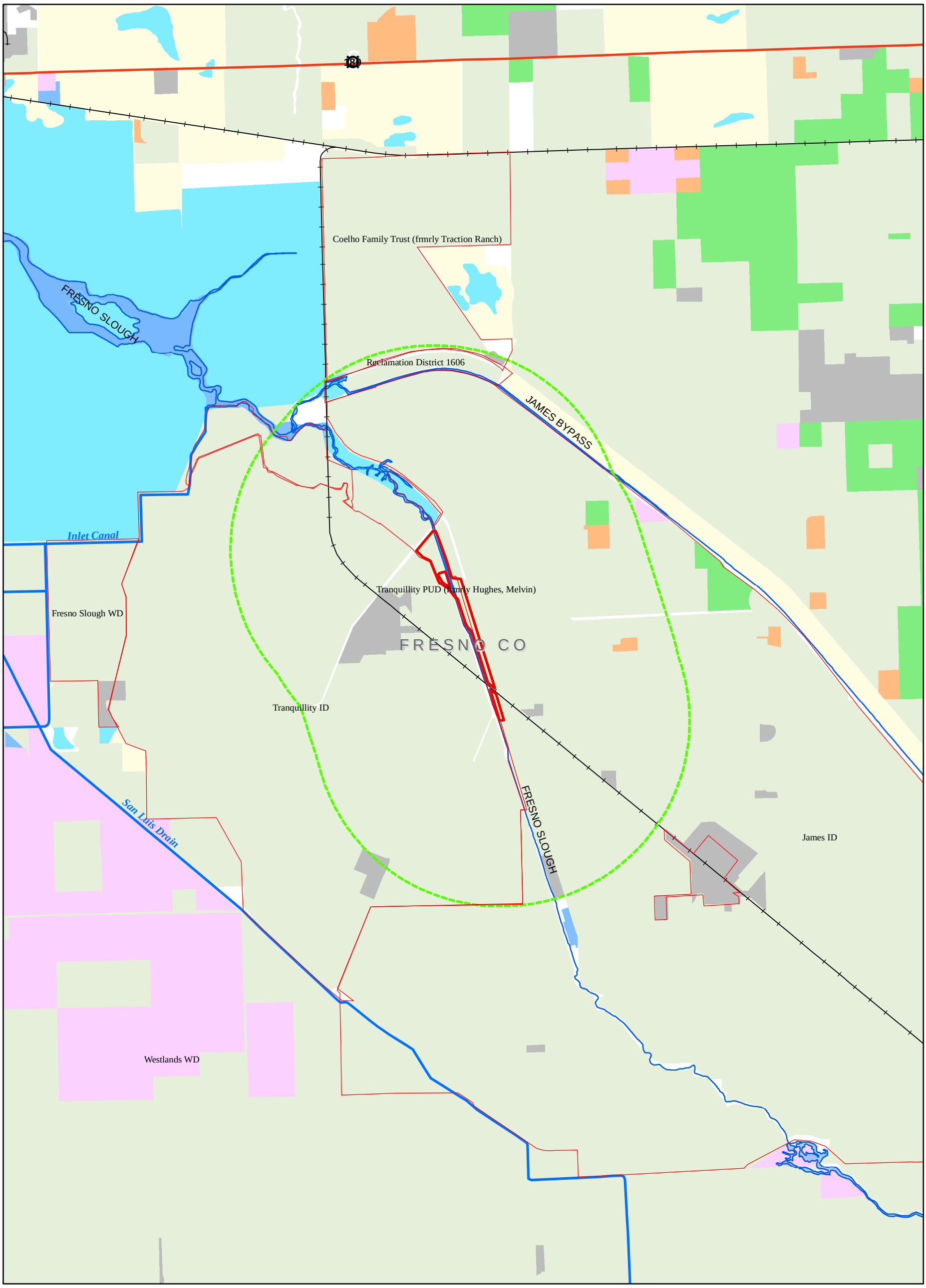
Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-45



Legend

- Tranquillity PUD
- 2 mile buffer

Land Use/Land Cover

Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

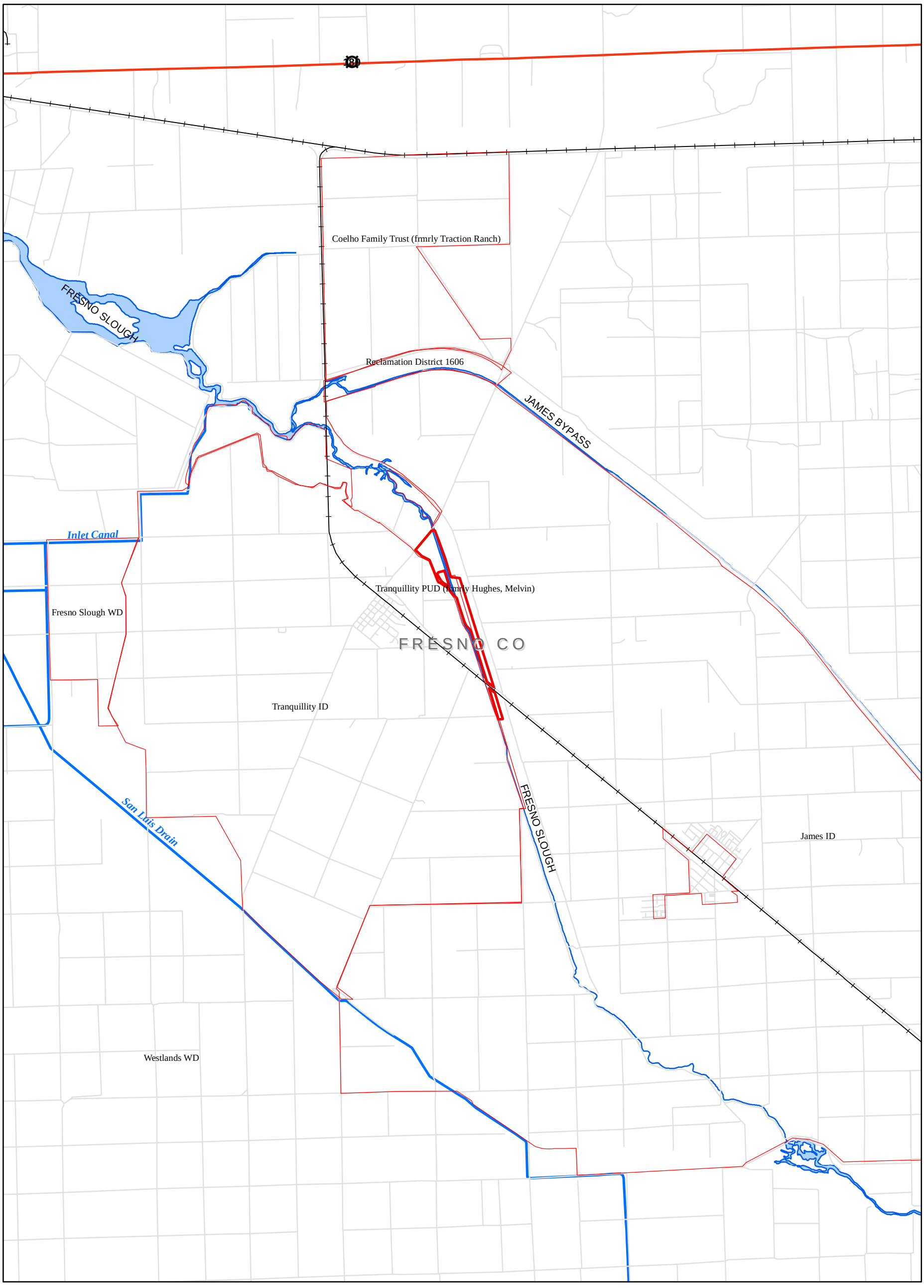
Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-24 Tranquillity Public Utility District
Current Land Use/Land Cover

0 0.5 1 2 3 4 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-46



Delta Mendota Canal Unit Water Contractor Boundaries

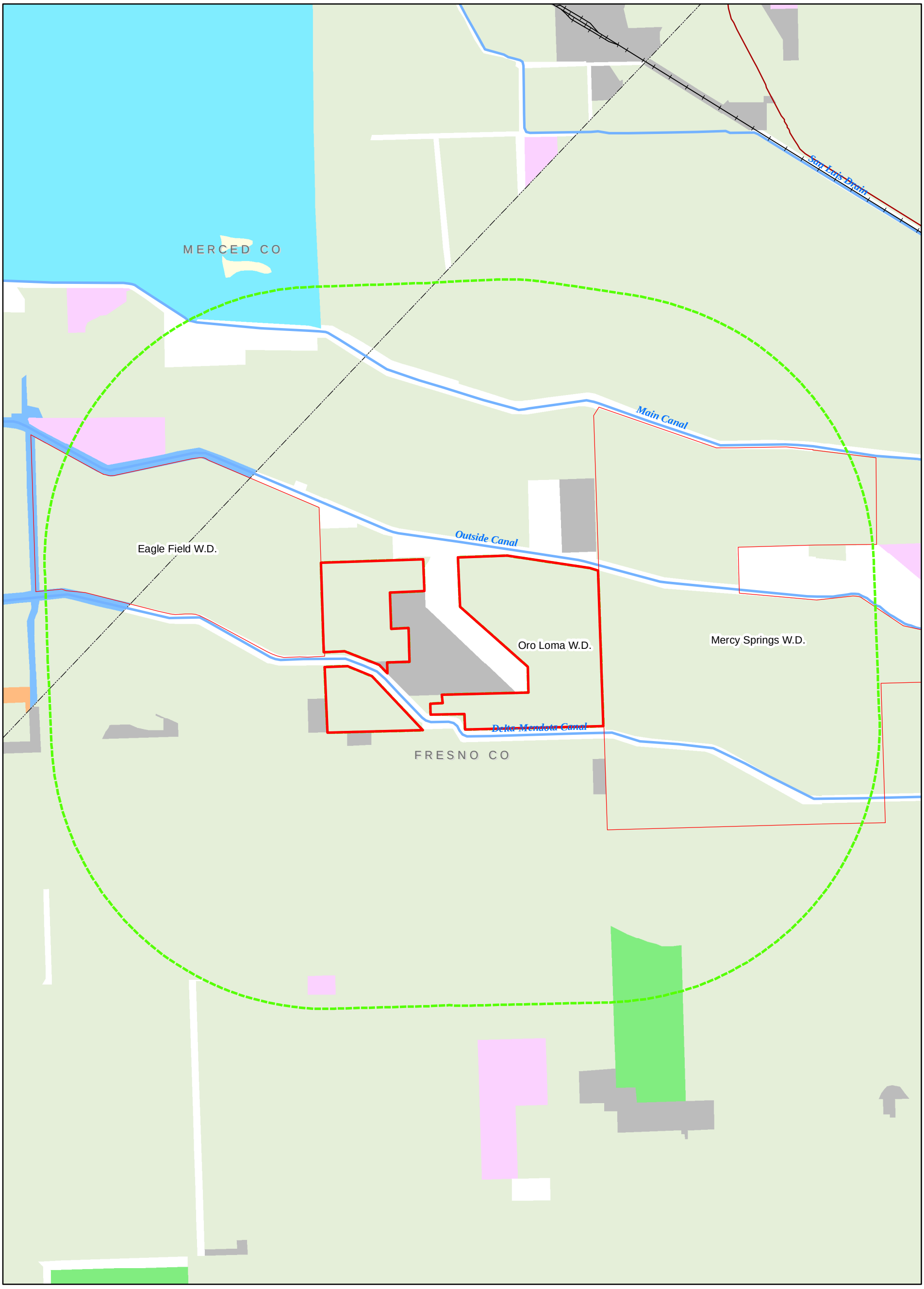
Figure 3.1-25 Tranquillity Public Utility District Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 3 4 Miles

214-202-47



Legend

- Oro Loma WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

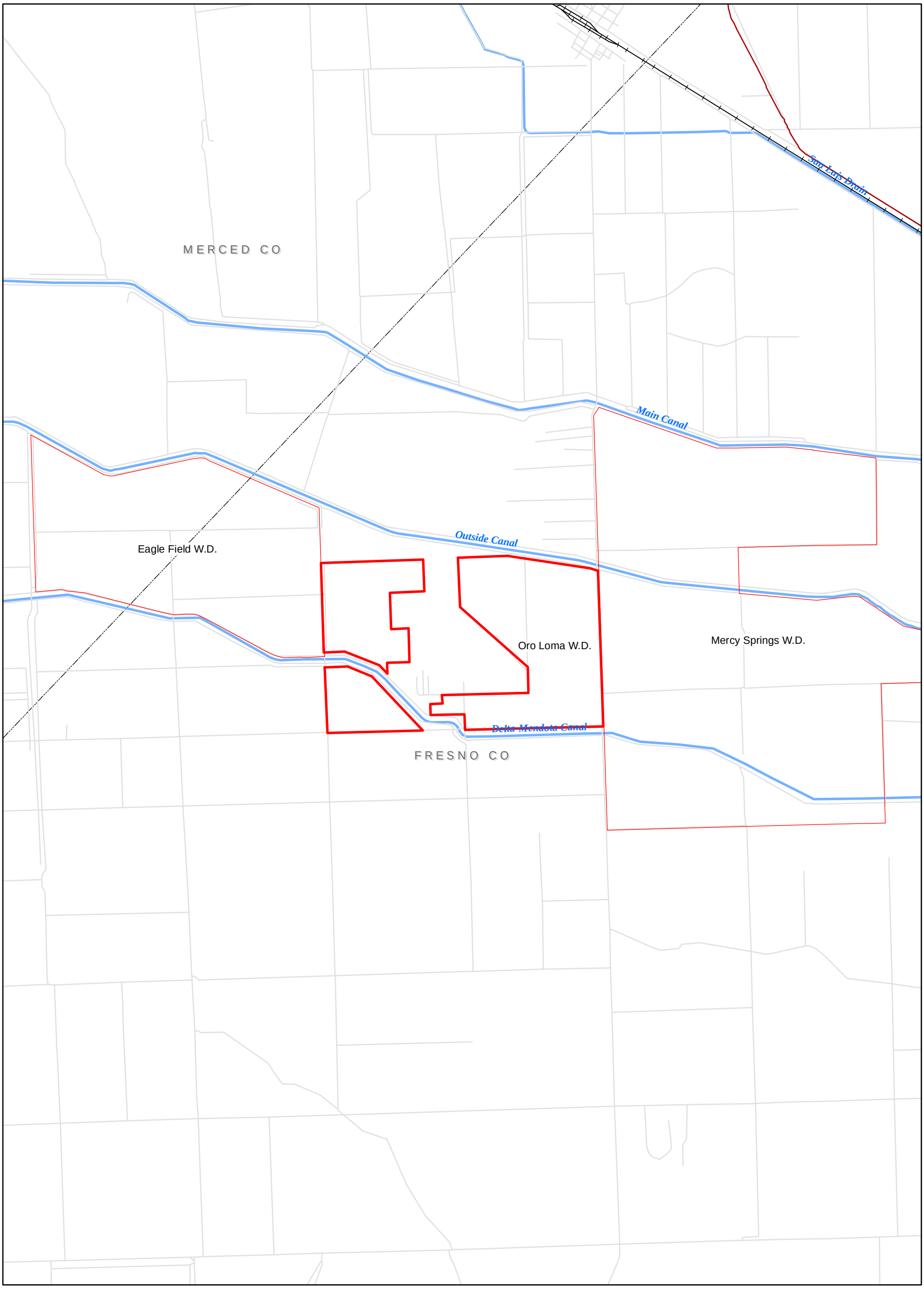
Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-26 Oro Loma Water District Current Land Use/Land Cover

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-48



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-27 Oro Loma Water District Boundary

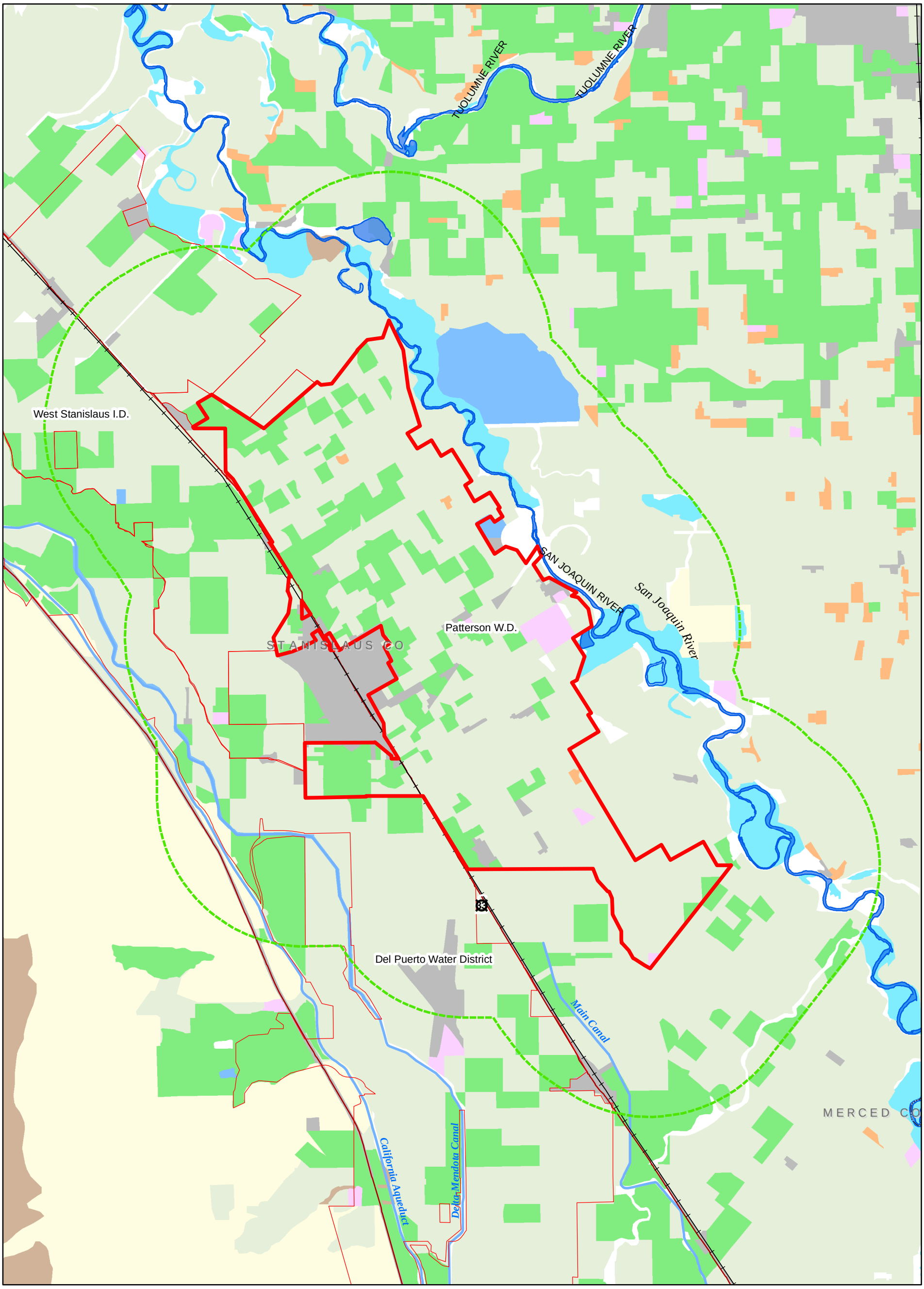
Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-49



Legend

- Patterson WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

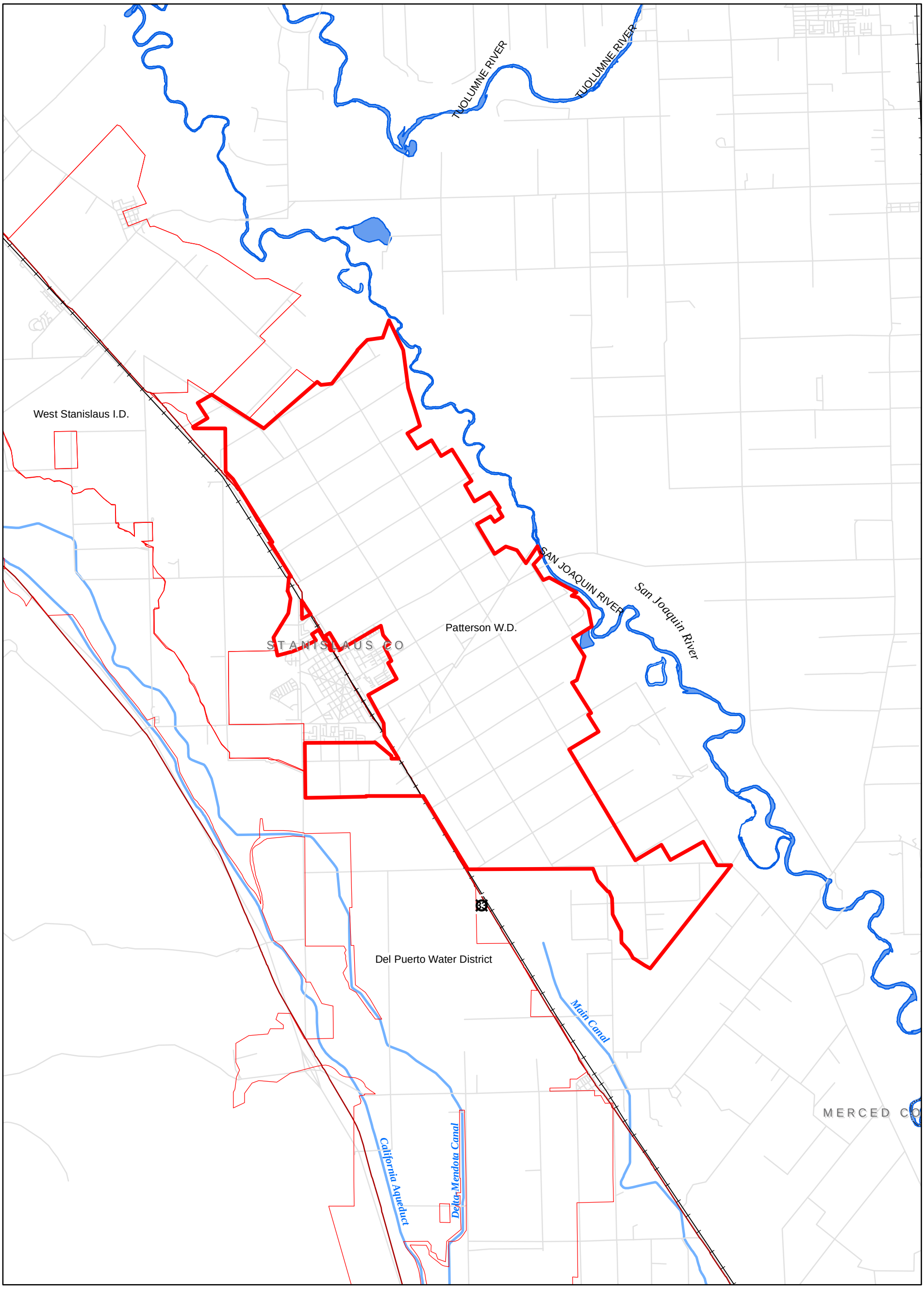
Figure 3.1-28 Patterson Water District Current Land Use/Land Cover

Miles

0 1 2 4

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-50



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-29 Patterson Water District Boundary

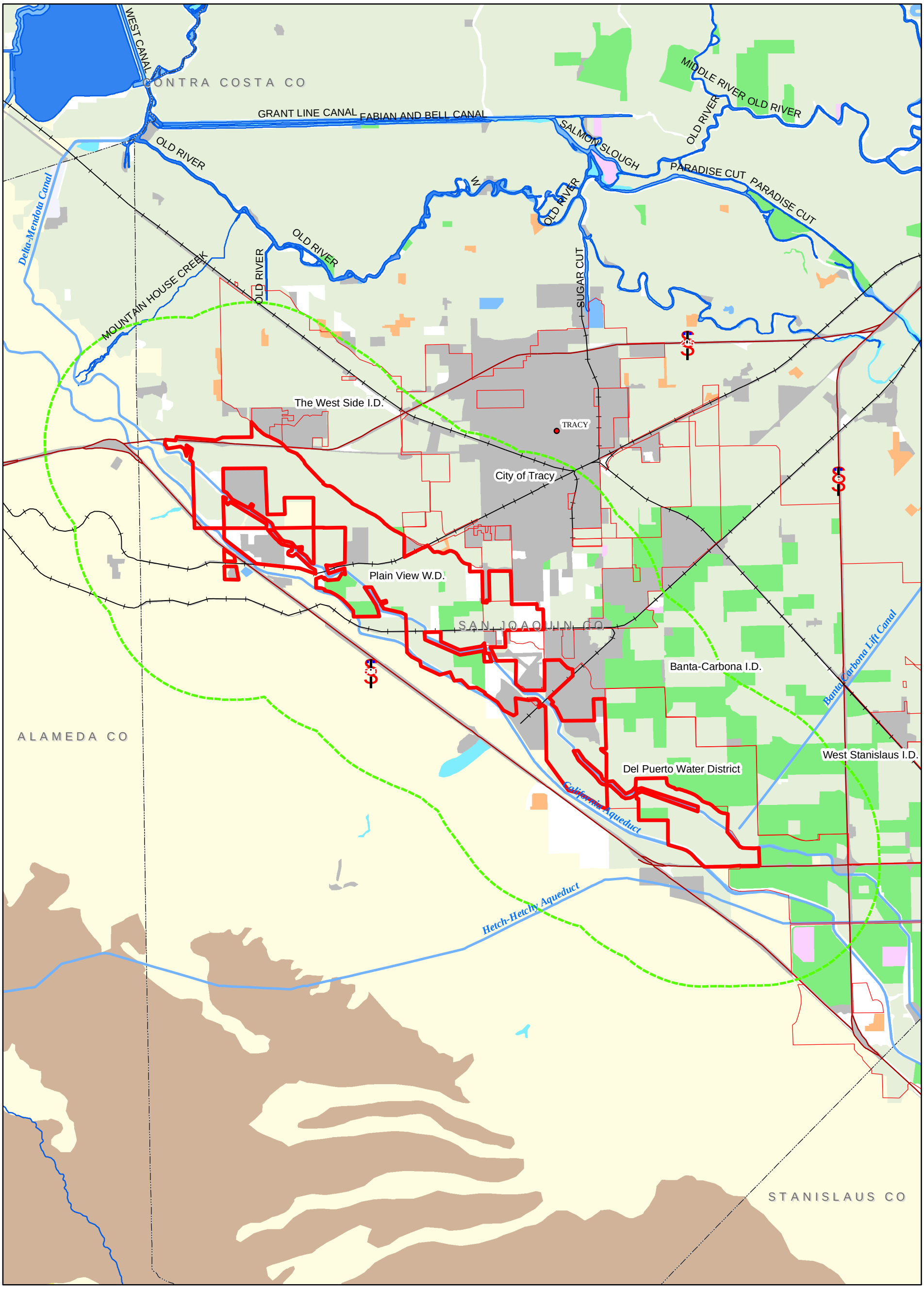
Legend

District Boundary/Contractor's Service Area

0 1 2 4 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-51



Legend

- Plain View WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

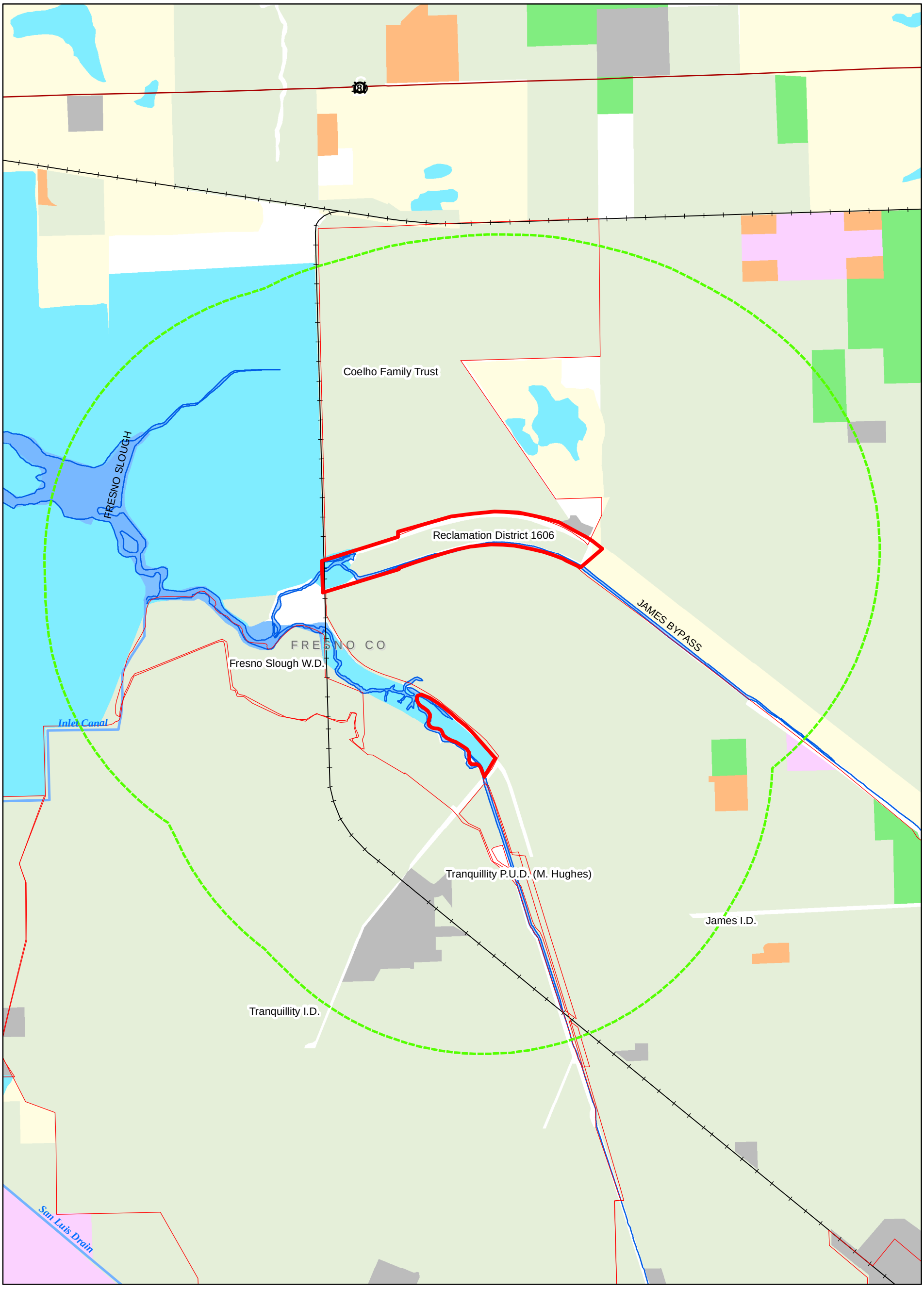
Figure 3.1-30 Plain View Water District Current Land Use/Land Cover

Miles

0 1.25 2.5 5

U. S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-52



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-32 Reclamation District #1606
Current Land Use/Land Cover

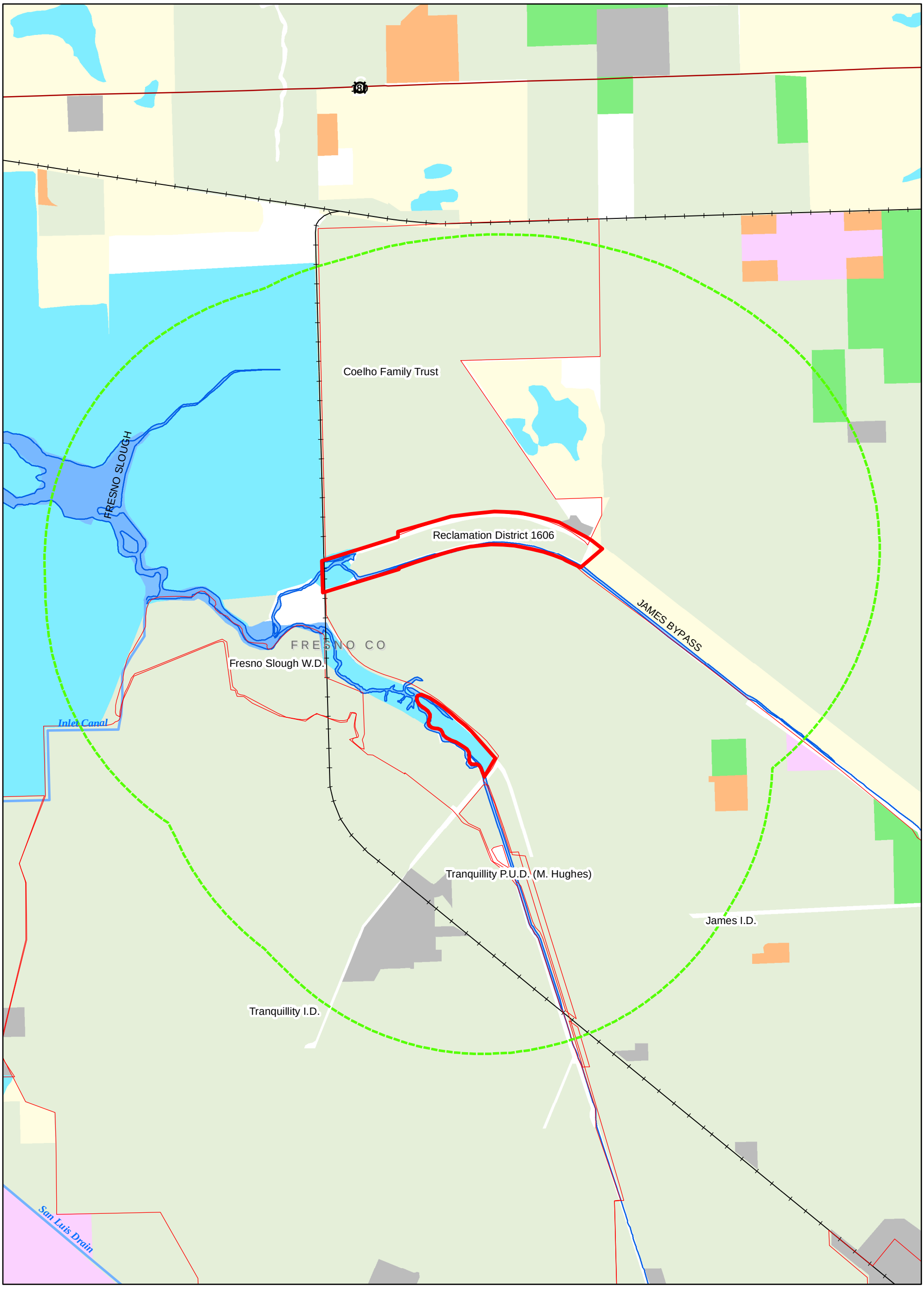
Legend

- Reclamation District 1606
- **Land Use/Land Cover Classification**
- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer

Miles
0 0.5 1 2

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-54



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-32 Reclamation District #1606
Current Land Use/Land Cover

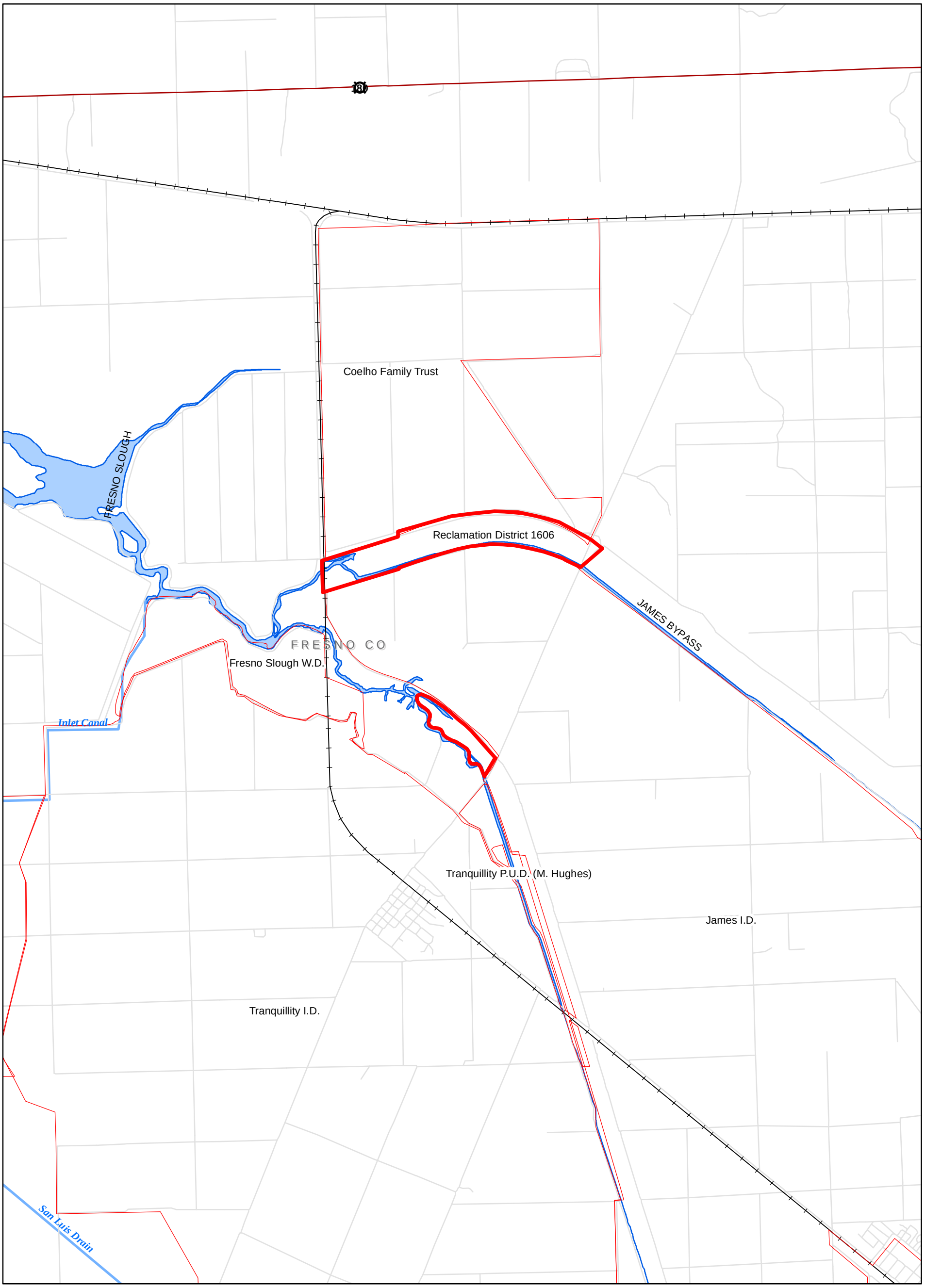
Legend

- Reclamation District 1606
- **Land Use/Land Cover Classification**
- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer

Miles
0 0.5 1 2

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-54



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-33 Reclamation District #1606 Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U. S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-55

Coelho Family Trust
FRESNO SLOUGH
Reclamation District 1606
JAMES BYPASS
Inlet Canal
WWD Lateral 6
Fresno Slough W.D.
Tranquillity P.U.D. (M. Hughes)
Tranquillity I.D.
FRESNO CO
San Luis Drain
FRESNO SLOUGH
James I.D.

Legend

- Tranquillity ID
- **Land Use/Land Cover Classification**
- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren
- 2 mile buffer

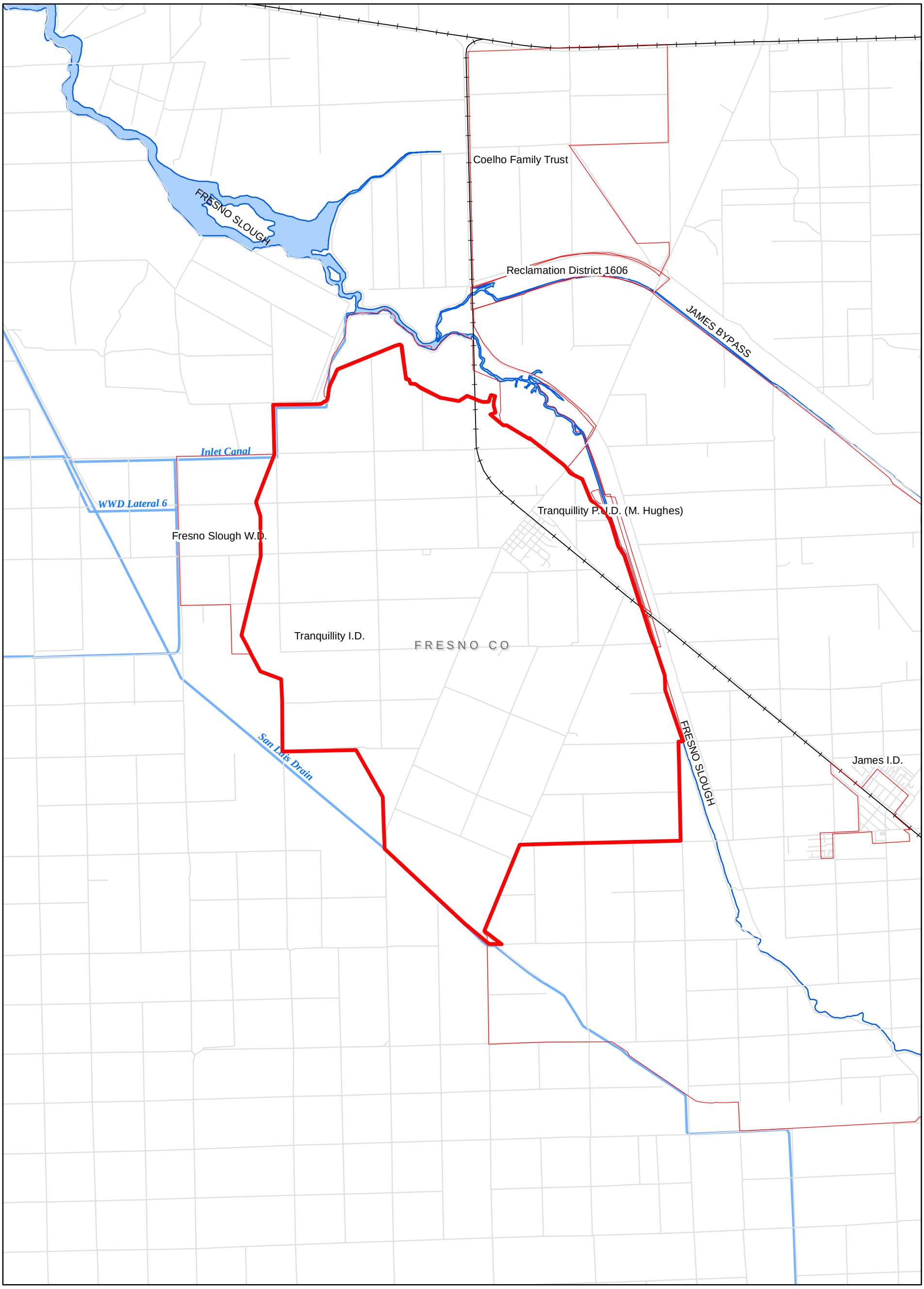
Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-34 Tranquility Irrigation District
Current Land Use/Land Cover

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-56



Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-35 Tranquility Irrigation District Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-57

VICTORIA CANAL
OLD RIVER
OLD RIVER
WEST CANAL
CONTRA COSTA CO
MIDDLE RIVER
GRANT LINE CANAL
FABIAN AND BELL CANAL
SALMON SLOUGH
OLD RIVER
OLD RIVER
OLD RIVER
PARADISE CUT
PARADISE CUT
OLD RIVER
OLD RIVER
OLD RIVER
SUGAR CUT
MOUNTAIN HOUSE CREEK
205
The West Side I.D.
SAN JOAQUIN CO
TRACY
City of Tracy
205
ALAMEDA CO
Plain View W.D.
205
California Aqueduct
Banta-Carbona I.D.
Delta-Mendota Canal
Banta Carbona Lift Canal
Del Puerto Water District
Hetch-Hetchy Aqueduct

Legend

- The West Side ID
- 2 mile buffer

Land Use/Land Cover

Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-36 The West Side Irrigation District Current Land Use/Land Cover

0 1.5 3 6 Miles

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-58

VICTORIA CANAL
OLD RIVER
OLD RIVER
WEST CANAL
CONTRA COSTA CO
MIDDLE RIVER
GRANT LINE CANAL
FABIAN AND BELL CANAL
SALMON SLOUGH
OLD RIVER
OLD RIVER
OLD RIVER
PARADISE CUT
PARADISE CUT
OLD RIVER
OLD RIVER
OLD RIVER
MOUNTAIN HOUSE CREEK
SUGAR CUT
The West Side I.D.
SAN JOAQUIN CO
TRACY
City of Tracy
ALAMEDA CO
Plain View W.D.
California Aqueduct
Banta-Carbona I.D.
Delta-Mendota Canal
Del Puerto Water District
Banta Carbona Lift Canal
Hetch-Hetchy Aqueduct

Delta Mendota Canal Unit Water Contractor Boundaries
Figure 3.1-37 The West Side Irrigation District Boundary

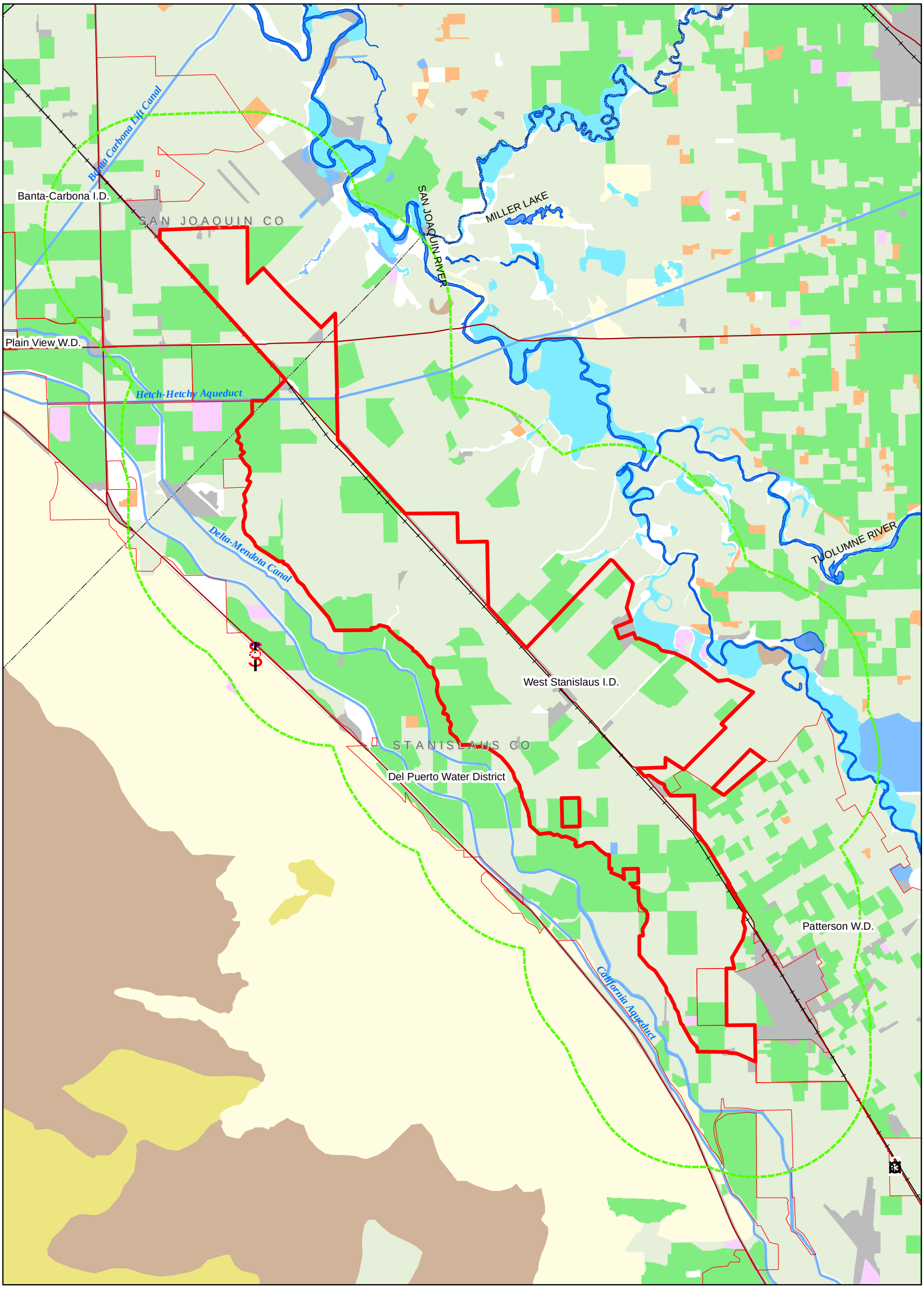
Legend

District Boundary/Contractor's Service Area

0 1.5 3 6 Miles

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-59



Legend

- West Stanislaus WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-38 West Stanislaus Water District Current Land Use/Land Cover

0 1.5 3 6 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-60

Banta Carbona Lift Canal
Banta-Carbona I.D.
SAN JOAQUIN CO
SAN JOAQUIN RIVER
MILLER LAKE
Plain View W.D.
Hetch-Hetchy Aqueduct
Delta-Mendota Canal
TUOLUMNE RIVER
West Stanislaus I.D.
STANISLAUS CO
Del Puerto Water District
Patterson W.D.
California Aqueduct

Delta Mendota Canal Unit Water Contractor Boundaries
Figure 3.1-39 West Stanislaus Water District Boundary

Legend

District Boundary/Contractor's Service Area

0 1.5 3 6 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-61

San Luis Drain

Main Canal

Outside Canal

Mercy Springs W.D.

Delta-Mendota Canal

FRESNO CO

Widren W.D.

Broadview W.D.

Legend

- Widren WD
- 2 mile buffer

Land Use/Land Cover Classification

- Urban
- Cropland and pasture
- Orchards and vinyards
- Confined feeding operations
- Idle or retired farmland
- Ruderal or unclassified rangeland
- Herbaceous Rangeland
- Shrub and brush or mixed rangeland
- Forested land
- Water
- Wetland/riparian
- Barren

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-40 Widren Water District Current Land Use/Land Cover

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

214-202-62

San Luis Drain

Main Canal

Outside Canal

Mercy Springs W.D.

Delta-Mendota Canal

FRESNO CO

Widren W.D.

Broadview W.D.

Delta Mendota Canal Unit Water Contractor Boundaries

Figure 3.1-41 Widren Water District Boundary

Legend

District Boundary/Contractor's Service Area

0 0.5 1 2 Miles

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

214-202-63

DELTA-MENDOTA CANAL UNIT

ENVIRONMENTAL ASSESSMENT
LONG-TERM CONTRACT RENEWAL

Chapter 4
Other Considerations

February 2005

CHAPTER 4

OTHER CONSIDERATIONS

This section discusses other analyses typically required by or included in NEPA documents. It includes a review of potential environmental justice impacts, irreversible and irretrievable commitments of resources, and Indian trust assets.

ENVIRONMENTAL JUSTICE

As mandated by Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, this EA addresses potential environmental justice concerns. The Executive Order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.[1] In August 1994, the Secretary of the Interior issued an environmental justice policy statement directing departmental action resulting in the Department of the Interior's Strategic Plan for Environmental Justice (http://www.doi.gov/oepc/ej_goal1.html).

Renewal of the long-term water service contracts between Reclamation and the water contractors within the DMC Unit will not involve the construction of new facilities, result in any known health hazards, cause the generation of any hazardous wastes, or result in any property takings. Moreover, renewal of these DMC Unit contracts will not directly or indirectly cause disproportionately high and direct or indirect adverse human health or environmental effects. In examining impacts to the study area as a whole, it could be determined that renewal of the long-term water service contracts would not disproportionately affect the human health or physical environment of minority or low-income populations. To the extent that long-term renewal of DMC Unit contracts for CVP water have the potential to disproportionately affect the economic conditions of certain communities within or affected by CVP water deliveries, such agricultural and socioeconomic effects are discussed in Section 3.2 and 3.3 of this EA.

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[1] Executive Order 12898 specifically states that "[t]o the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands."

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

As discussed further in Section 3.11, Cultural Resources, compliance with Section 106 of the National Historic Preservation Act and other federal rules and regulations could be required for new undertakings (for example, if substantial new lands are to be incorporated within district boundaries [inclusions] or land use changes are proposed involving use of federally contracted water). Section 106 and the other relevant federal rules and regulations are designed to ensure that all eligible and potentially eligible archaeological or historical sites are adequately inventoried. "Inventory" includes the identification, evaluation in relation to NRHP eligibility criteria, and assessment of effects in relation to proposed project impacts. As a consequence, implementation of treatments recommended in the Section 106 consultation and the related process results in reducing to less-than-adverse levels the impacts that a project might have on eligible or potentially eligible archaeological or historical sites. By definition, reducing impacts to less-than-adverse levels implies that there would be no irreversible or irretrievable commitments of cultural resources. No other irreversible or irretrievable commitments of resources resulting from the renewal of long-term contracts were identified for any of the other resources analyzed in this EA.

INDIAN TRUST ASSETS

DEFINITION OF INDIAN TRUST ASSETS

The United States has a trust responsibility to protect and maintain rights reserved by or granted to federally recognized tribes and individual Indians, by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. The trust responsibility requires that all federal agencies, including Reclamation, take all actions reasonably necessary to protect Indian Trust Assets (Reclamation 1994).

Indian Trust Assets are legal interests in property held in trust by the federal government for federally recognized Indian tribes or individual Indians. "Assets" are anything owned that has monetary value. "Legal interest" means there is a property interest for which there is a legal remedy, such as compensation or injunction, if there is improper interference. Indian Trust Assets do not include things in which a tribe or individual Indians have no legal interest (Reclamation 1994).

Indian Trust Assets can be real property, physical assets, or intangible property rights, such as a lease or a right to use something. Indian Trust Assets cannot be sold, leased, or otherwise alienated without approval by the United States. While most Indian Trust Assets

are located on reservations, they can also be located off reservations. Examples of Indian Trust Assets are land, minerals, hunting and fishing rights, water rights, and instream flows. Off-reservation cultural resources located on non-trust land are usually not Indian Trust Assets (Reclamation 1994).

INDIAN TRUST ASSETS ANALYSIS

Reclamation examined geographic information system coverage that depicts the distribution of trust land in the Mid-Pacific Region. No trust lands were found within the DMC Unit study area. The nearest trust lands to the DMC Unit study area are located 45 to 65 air miles east and south of the study area. These trust lands belong to the Big Sandy Rancheria, Buena Vista Rancheria, Chicken Ranch Rancheria, Cold Springs Rancheria, Northfork Rancheria, Picayune Rancheria, Santa Rosa Rancheria, Sheep Ranch Rancheria, Table Mountain Rancheria, and Tuolumne Rancheria . The Ione Rancheria and California Valley Mi-wok, although federally recognized, do not possess trust land.

Departmental Manual Part 512, Chapter 2, Departmental Responsibilities for Indian Trust Resources requires Reclamation to "identify any impacts of Departmental plans, projects, programs or activities on Indian trust assets, or tribal health and safety." Reclamation can identify no causal link between the proposed execution of the DMC Unit long-term contract renewals and impacts to Indian trust assets.

The Hoopa Valley Tribe (located on the Trinity River) has informed Reclamation that the Tribe finds that other long-term contract renewal environmental documents inadequately address the potential effects on Indian Trust Assets caused by such renewals. In particular, the Tribe cites that such renewals will adversely affect Reclamation's obligation in the Trinity River Restoration Record of Decision to maintain flows at levels mandated in the Record of Decision. Reclamation's subject matter experts find no adverse causal link between the renewal of the DMC Unit long-term contracts and the Tribe's ability to exercise its federally reserved fishing rights or Reclamation's obligation under the Trinity River Restoration Record of Decision to maintain flows at the mandated levels. The rationale is that (1) flow requirements on the Trinity River are determined by hydrologic conditions in the Trinity Basin and are unrelated to water demands south of the Delta, (2) the system-wide effects of implementing fishery restoration on the Trinity River were the subjects of the environmental impact statement for the Trinity River Mainstem Fishery Restoration and the CVPIA PEIS and are assumed to be in place for all of the alternatives considered in this EA, and (3) Reclamation's trust responsibility is documented in the consultations for the Trinity EIS/EIR and the CVP Operations Criteria and Plan biological assessment-biological opinion.

In conclusion, Reclamation believes there is no interrelationship or interdependency between the Trinity River Mainstem Fishery Restoration and the proposed DMC Unit long-term contract renewals. The exercise of the provisions in those contracts is not dependent on the Trinity River Mainstem Fishery Restoration activities, and the restoration activities are not dependent on the execution or non-execution of the DMC Unit long-term contracts renewals.